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# TRANSACTIONS

OF THE

# Odontological Society of Great Britain.

VOL. IX.—NEW SERIES.

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# ODONTOLOGICAL SOCIETY

OF

# GREAT BRITAIN.

VOLUME IX.—NEW SERIES.

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# GENERAL MONTHLY MEETING.

*November 6th*, 1876.

CHARLES VASEY, Esq., President, in the Chair.

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The Minutes of the last Meeting were read and confirmed.

The President said, Mr. Alfred Canton had sent in his resignation as an ordinary member, on account of ill health and retirement from practice, and the Council considered it a case in which the honorary distinction should be conferred, and had therefore nominated him with that view.

The following gentlemen were nominated for Membership:—

Mr. Alfred Canton, M.R.C.S., L.D.S., honorary.

Mr. A. E. Swanson, L.D.S., 112, Cheapside, resident.

Mr. Pedro Bruce, M.R.C.S., L.D.S., Calle de la Aduana, 100, Valparaiso, non-resident.

Mr. Gilbert Mallett, having signed the obligation-book, was formally admitted a member.

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Mr. White wished to make a casual communication relative to a contrivance, the practice of which he had found rather serviceable. When it was found unavoidable that a fastening should be attached within sight of the front teeth, it was gene-

rally recommended to put a little piece of floss silk round. That had many disadvantages, and he had frequently employed in its place a solution of the pink rubber in benzoline, roughening the fastening, and painting it over so as to give it a firm coat. This seemed to answer very well. It hid the fastening and was tolerably permanent.

Mr. Fothergill produced models of a regulating case, in which all the upper incisors closed within the lower, the canines closed outside the lower and the laterals were quite close to the bicuspids. He extracted the right first bicuspid, and the left first molar, which was very much decayed, and got the incisors into place by a vulcanite piece inside, with gold tabs to cause them to bite over, and then drew the canines and bicuspids into place by means of bands with the vulcanite plate, shown with the model. The process was commenced in the middle of April and finished at the beginning of September.

Mr. Hutchinson brought forward three models of curious cases of dentition which had occurred in private practice. In one case there was a germinated lateral incisor, in a very good position, and the bicuspid tooth was close up to it. The canine was appearing to thicken the gum just above the junction between the germinated lateral and the bicuspid, and the treatment was to remove the bicuspid in the hope that the canine would come into its place, the intention being to leave the germinated lateral, which to the unprofessional eye scarcely spoiled the mouth at all.

In the next model the supernumerary tooth had taken the unusual place of the median line of the mouth, separating the two centrals to the extent of nearly half an inch. This was removed, and the two teeth brought together in the usual way. The especial interest of the case was that it seemed to be hereditary, the mother and aunt of the patient having both of them a similar tooth.

The third case was simply an illustration of the long persistence of the temporary second molar tooth ; and the reason why he brought these simple cases before the Society was in

the hope that members who might meet with similar ones would be induced to send them to swell the contents of the Museum, where they would be much more useful than when kept in the cupboards of private practitioners.

Mr. TURNER stated that a drill adapted to piercing teeth or stoppings had been sent to the Society by Mr. McAdam, jun., of Hereford. Mr. McAdam strongly recommended it to those gentlemen who used the burring engine. Specimens of old-fashioned mineral teeth had also been sent by Mr. Bruce, of Valparaiso, who was formerly a pupil in the Hospital.

The result of Mr. Fothergill's treatment of the irregularity which came under his care must have been equally gratifying to his patient and to himself. He observed on the apparatus a brown indiarubber ring, but believed they could all get much better rings by cutting them off indiarubber tubes instead of buying them made. They would lie better round the teeth, were tougher, and would last longer. Dr. Norman Kingsley, of New York, first told him of this, and he had followed the advice with very great comfort and satisfaction.

Mr. COLEMAN thought they got even better rings by cutting them out of pieces of rubber dam. They got pure indiarubber, they were more elastic, and, as a rule, would last longer than any vulcanized indiarubber cut from tubes.

Mr. TURNER said the ring cut from a pipe was entirely different in shape from the one cut from flat pieces of rubber. He had tried them, and could not get anything like the shape of ring obtained from the pipe.

Mr. HUTCHINSON did not know whether Mr. Turner had seen the pure indiarubber tubing used for the ether spray apparatus. It was made of pure rubber, and gave the advantage of the shape of the ring, and the absence of the process of vulcanizing the caoutchouc. It could be obtained in all sizes, from the thickness of a knitting-needle to the three-quarter inch gaspipe.

The PRESIDENT said that since Mr. Turner told him about cutting the rings from the tubing he had found the plan of very great service.

Mr. COLEMAN said he had found portions of the rubber dam extremely useful in this way in hospital practice. Patients came with cases where the lower teeth bit over the upper, and by placing a ring of that kind round the head, padding with lint or cotton-wool when necessary, and then placing it over the teeth, on several occasions within a day or two he had brought the upper incisors in front of the lower with very little difficulty.

The PRESIDENT.—With a single thickness of rubber dam?

Mr. COLEMAN.—Yes. He had used the tube for years, but latterly preferred the rubber dam for the purpose, and always employed it. The only difficulty was the tendency to slip off; but with a little arrangement that could be overcome. The very fact of its pressing upon the lip kept the mouth open, and in favourable cases one or two nights were quite sufficient to bring the upper incisors in front of the mouth. This was a very simple way of treating these cases in hospital practice.

Mr. MOON said he had found the plan useful both in hospital and private practice, of checking irregularity by filing the front surface of the lower canine and the lingual surface of the upper canine so as to form inclined planes, and give the proper position to the jaw. He was speaking of the temporary teeth.

The PRESIDENT said that would only be applicable in those cases where the development had proceeded to the extent that the teeth met each other.

Mr. MOON said one often saw cases where the canine teeth were left standing higher than the others; the temporary incisors having been shed, the canines remained, and the outstanding of the lower canines threw forward the lower jaw

unduly. By taking off the point, of the canine and giving it the form of an inclined plane, the lower jaw could slide back behind the upper.

Mr. WHITE, referring to Mr. Fothergill's models, asked if any tendency had been found in the canines to run out since they had been brought in. He generally found in such cases that if they got a tooth in, there was a great tendency for it to run out again. In one case where he brought in the whole of the six incisors, which laid over the lower lip, he made the patient wear a plate for two years, by which time they were brought in and very much improved; but two years afterwards they were out again very nearly a quarter of an inch. One often met with these cases, and it was very desirable to get these canines in and keep them in if possible.

Mr. FOTHERGILL said the model was only taken in the previous week, so that there had been no running out at present. The apparatus had not been worn since the time mentioned.

The PRESIDENT said the mineral teeth sent by Mr. Bruce were really wonderful specimens of artificial substitutes for the natural organ. He was sure, on looking at them, they ought to have a feeling of gratitude towards the late Mr. Ash for the introduction of his teeth. They seemed to belong to a bygone age altogether, and yet it was only thirty-five years since he used to use those teeth. Mr. Fothergill's models reminded him of a case in which he undertook to bring a canine tooth forward at the age of thirty-three. He should like to know what was the latest period of life at which the regulation of such teeth had been undertaken.

Mr. FOTHERGILL said that last year he treated a very complicated case of a young lady of twenty-three. In that case the two central upper incisors closed within the lower and the laterals outside; the right canine projected very considerably; the left lateral was broken, and he extracted it.

That gave room to get the centrals forward, and it made a very excellent case in about six months.

Mr. Brown Mason said the most obstinate case that ever came under his hands was that of a lady who came to him seven years since with the whole of the six incisors very much projecting. By removing the two bicuspids he got the incisors back. It was a very obstinate case. He saw the patient every day for nearly three months, and she wore a plate for nearly a year, and during the night for a much longer period. She was twenty years of age when he first saw her.

*Alveolar Abscess, dependent on Diseased Teeth.*—By G. D. Pollock, F.R.C.S., President of the Pathological Society of London.

Mr. President and Gentlemen,

The consideration of Alveolar Abscess can be nothing new to the members of the Odontological Society, but it must always be one of interest, as it is by no means an uncommon occurrence, and is not unfrequently important in its consequences. Moreover, it is a condition which may especially be said to bring together in consultation the dentist and the surgeon; and, as far as my experience goes, the cause of the mischief is too frequently overlooked by the medical practitioner. I hope, therefore, I need offer no apology in making it the subject of the present communication.

I have so frequently had occasion to call the attention of our pupils at St. George's Hospital to this subject, that I have occasionally almost felt that I might be supposed to be riding a hobby too hard. But your President will bear me witness that, with all we have done and said in past

years, the recurrence of such cases—I might almost say monthly—proves that the subject is not too generally or fully appreciated; that the cause is frequently overlooked by the medical attendant, and that the patient is consequently permitted to linger on in discomfort, and often with disfigurement.

Alveolar abscess may be considered as of two varieties--one of a superficial and comparatively innocent character, popularly known as gum-boil; the other of a deeper formation, and complicated with various conditions, and what we may truly designate as perforating alveolar abscess. Gum-boil may occur on either side of the alveolus, forms quickly, and usually, when opened, heals as quickly. I do not propose to deal more with this class of cases than to express the opinion that if the abscess recurs frequently, as it is occasionally apt to do, care should be taken to examine thoroughly into the condition of the tooth, and, as regards treatment, to give vent to matter as early as possible. How far simple inflammation of a healthy tooth, or a defective or carious condition, gives rise to such an abscess, we need not now stop to inquire. The more formidable and deep-seated abscess, originating in the alveolar cavity —most often at the extremity of a fang—and which makes its way through the alveolar process, and as a rule outwards,—true alveolar abscess,

which constantly demands the aid of the surgeon, —is the chief subject I wish to draw attention to.

The cause and the mode of origin of alveolar abscess have been well and fully considered by those who have already written on diseases of the teeth. I think, however, it is desirable to refer shortly to some of these observations. Hunter,* in reference to this, says:—"Sometimes deeper abscesses occur than those commonly called gum-*biles*. They are often of very serious consequences, producing carious bone. They commonly arise from disease in the tooth, and more especially in the cuspidati; these teeth passing further into the jaw than the others. Their depth in the jaw being beyond the attachment of the lip to the gum, if an abscess forms at their points, it more readily makes its way through the common integuments of the face than between the gum and lips, which disfigures the face; and when in the lower jaw, looks like the evil. In the upper jaw it makes a disagreeable scar on the face, about half an inch from the nose. These, although they may sometimes arise from diseases of the teeth and gums, yet are properly the object of common surgery, and the surgeon must apply to the dentist if his assistance is neceesary to pull out the tooth, or to perform any other operation which comes under his province."

* "The Natural History of the Human Teeth," p. 171.

Fox* says:—"Carious teeth frequently become inflamed at the root, and suppuration takes place in the socket, attended with swelling and soreness of the gums. In these cases the same laws are observed for the exit of matter as in abscess in general; viz., ulceration takes place in some part of its surface, so as to make an outlet for the matter in the best possible situation. When matter forms at the root of a tooth, the periosteum which covers its fang thickens, and in some cases becomes detached from it; the matter is accumulated as in a bag, by the extension of which considerable pressure is made against the sides of the socket, the consequence of which is, that that part of the alveolar process situated on the outside becomes absorbed, rather than that within the mouth."

Mr. Tomes † says:—"With the formation of pus a process is established for effecting its escape. Either the periosteum becomes detached through the whole length of the fang, and the matter is discharged at the neck of the tooth, or, what is much more common, a hole is formed in the wall of the alveolus, through which the pus gets into the gum. In some few cases, in which the inflammation implicates to a considerable extent

* "The Natural History and Diseases of the Human Teeth," p. 69.

† "Dental Physiology and Surgery," p. 279.

the adjoining tissues, the abscess, instead of opening in the gum, extends into the cheek and opens on the surface of the face, and through the opening pus continues to be discharged till the tooth is removed."

Mr. Bell * remarks that, "of all the diseases which attack the gums and alveolar processes, none is so common, and, perhaps, few are so frequently misunderstood as that which is commonly termed 'gum-*bile*.' The very name which is popularly given to it is at once a proof of the mistaken notion commonly entertained respecting its nature, and a means of perpetuating the error. The gum is, in fact, only secondarily affected, the cause being invariably seated within the alveolus. I propose, therefore, to call it alveolar abscess, as more correctly designating its true nature and situation. It is produced by various causes. Now and then, though very rarely, it is the result of inflammation of the periosteum of the sound tooth, from cold or some other local cause; or it may arise from mechanical injury to a tooth, as its being loosened, or partially dislocated by a blow. The irritation of toothache is also a common cause of its occurrence; but by far the most general is the existence of a dead tooth or root, acting as an extraneous body in the socket."

* "The Anatomy, Physiology, and Diseases of the Teeth," p. 217.

Mr. James Salter says:—"The presence of dentinal caries is its most frequent cause by far, and it may or may not be preceded or accompanied by toothache."

Whether any other causes than caries of a tooth be productive of alveolar abscess I cannot say; but as far as an experience now extending over some years enables me to express an opinion, I can say truly of the many instances which have come to my notice, I have never seen one in which a defective or a carious tooth was not the cause of the mischief. The results of these abscesses are so various, their treatment is so often misunderstood by medical men, their complications and consequences are often so serious, and so constantly call for the interference of the surgeon, that I propose to relate my experience of some of these results.

From all I have observed, it seems to be by no means an uncommon circumstance that a patient should suffer no inconvenience from the presence of a decayed tooth, the cause of an alveolar abscess, until some external swelling or disfigurement, or disagreeable discharge from the nose takes place; and not till then does the patient have recourse to medical advice. It is this absence of toothache, I think, which leads so frequently to the true cause of alveolar abscess, with its consequences, being overlooked. That the

formation of the abscess is often almost painless and quite free from toothache I have seen exemplified in several cases. It has often happened to me to observe that when abscess has made its way externally, pain in the affected tooth is the last thing the patient would acknowledge; nor until the appearance of the swelling has the patient been aware of anything wrong. I conclude that in such cases, the progress of the abscess has generally been very slow; or, perhaps, some partial outlet to the matter has occurred through the decayed tooth, or that the perforation of the outer plate of the alveolus has occurred so early as to have allowed freedom to the pus, and that the patient has probably forgotten the pain he at first suffered, from its having been but slight.

Matter having once passed through the outer plate, may make its way in various directions, dependent somewhat on the position of the decayed tooth and its various surroundings.

I believe the rule holds good that all serious or important results are due to the abscess opening outwards, or upwards when in the upper jaw, the most common course; when it opens inwards it is, as far as I have observed, superficial and readily heals.

If the abscess has been allowed to open externally, or has been opened by the medical attendant, when pointing in any part externally,

and the offending tooth be not removed, the abscess soon contracts, but a sinus remains. The orifice of the sinus contracts, but becomes prominent, while the surrounding tissues become thickened and hardened. So that we observe in such cases a small elevated mass of infiltrated tissue, in the centre of which is often a nipple-like point of granulation, through which a fine probe may be passed deep down towards the surface and base of the alveolar process. If the thickened patch be taken between the fingers and attempted to be moved over the jaw, it will be found more or less adherent to the latter, often tied by a kind of string-like process to that part of the jaw in which the diseased tooth lies.

A lady was recommended to consult me by my friend Dr. Abercrombie, of Cheltenham. She had for two years suffered from an ulcer on the right side of her face, midway and a little posterior to a line drawn from the angle of the mouth to the base of the jaw. For its relief various local measures and much constitutional treatment had been ineffectually resorted to. Suspecting the cause of the ulcer, I examined the mouth, and found a decayed stump in the lower jaw corresponding to the situation of the ulcer. As soon as I alluded to the state of the tooth as its cause, the patient at once expressed her doubts on the point,

as she stated she had never suffered from tooth-ache. I, however, strongly recommended the removal of the tooth, as it offered the only chance for the ulcer to heal. I heard nothing more of my patient for some weeks, when she called to thank me for my advice. She applied to Mr. Rogers after she first saw me, and as he entirely confirmed my view of the case, the tooth was removed by him. The ulcer soon healed, but there remained a scar, which time alone could soften, but would never entirely remove.

In another case, after much or little pain about a tooth, a patient will complain of offensive discharge from the nose; and it is usually some assistance to the surgeon to note that this discharge is most distinctly referred to one nostril by the patient.

A gentleman consulted me a few years ago who had been for some two or three years a sufferer from constant offensive discharge from his right nostril. His health was good, his habits temperate, his residence the country; nor was there any suspicion of syphilis or scrofula. There was a constant disagreeable discharge from the right nostril. When lying down he was conscious of its trickling down the pharynx. He had been under much local and general treatment, with no apparent benefit. After careful examination of the nostril, which gave no evidence of disease, I

examined his mouth. I could not detect anything like a carious tooth, but one—the first molar—looked a little more discoloured than the rest. I tapped it sharply with the steel handle of a small instrument. This immediately made the patient wince. The tooth was unnaturally tender, and by my advice it was removed. A few days after he called to report improvement. The tooth produced was dark-coloured with its fangs inflamed. At the end of six weeks he had lost all sense of the discharge from the nostril, and when I saw him some time subsequently, he had quite recovered from this very disagreeable condition.

I could record other cases of abscess in the antrum, the result of decayed teeth, but this one case is sufficient to illustrate my statement, that much discomfort may occur with a defective tooth without the patient being cognisant of toothache.

The cases related may be considered comparatively simple in their results; but the effects of alveolar abscess are not always so. The following cases will prove my statement. A man was admitted into St. George's Hospital, under my care, with a large brawny swelling on the right side of his neck, extending from the surface of the jaw to the clavicle. It had encroached so much on the median line in front, that the larynx was much pushed to the left side, and this produced a good deal of difficulty in breathing. He could not

open his mouth to allow a proper examination of the teeth; but I suspected a bad tooth to be the cause of the mischief. Two incisions were made into the inflamed tissues with some relief. The following day there was more difficulty in breathing, and it was necessary to open the trachea to save life. The operation was rendered somewhat difficult by the displacement of the larynx. The swelling now began to subside, as there was free discharge from the wounds; and as soon as the mouth could be sufficiently opened, Mr. Vasey removed a decayed molar from the lower jaw, evidently the cause of all this mischief. The patient left the hospital quite well. But a short time ago I had to see a lady late one evening, with a large hard swelling between the chin and thyroid cartilage. She had some difficulty in breathing, and considerable difficulty in swallowing. A free incision in the median line allowed the escape of some very offensive pus, with great relief to her symptoms. I now examined her teeth; one lower incisor was painful on being tapped, and she consented to have it removed as soon as the swelling caused by the abscess had subsided. On removal, the extremity of the fang was found to be carious. After this she remained well for more than a year, when she again sent for me, with another abscess in the same situation. After the abscess was opened, the left middle

incisor, which was tender on being tapped, was also removed; and she remained well when last seen, some time subsequently.

Hunter, with his careful observation, has remarked that when abscess occurs in the lower jaw, it often "looks like the evil"; a condition to which, I conclude, we should apply the term "scrofulous" in these days. A well-marked and interesting case illustrative of Hunter's observation came under my notice at St. George's Hospital some few years ago. A comparatively healthy young woman was sent to me for a terribly bad ulcerated neck. From the base of the jaw, on the right side, to near the clavicle, was a mass of indurated, dark-coloured, and thickened skin and cellular tissue, with numerous ulcerated openings on the surface. To a less extent the left side of the neck was similarly affected. I was asked to recommend her for a bed at the Margate Infirmary, as it was supposed she was suffering from scrofulous ulceration of the neck. I may state that the parts were so much indurated, ulcerated, and so dark red in colour, that the general appearance was much more characteristic of the brawny condition of cancerous infiltration with ulceration than anything of a scrofulous nature. I was not, however, satisfied as to the character of this mischief, and made an examination of her mouth. On both

sides of the lower jaw were numerous decayed stumps. I suggested their removal, and she was handed over to the dresser of the week to be relieved of these stumps. To my great satisfaction, in the space of a short time, with very simple local applications, all the ulcers healed, and the integuments of the neck assumed a natural healthy condition. About a year or eighteen months after this, she again applied to me for some recurrence of ulceration on the left side of the neck. I looked in the mouth and saw two stumps remaining in the left lower jaw. I taxed her with not having carried out the instructions I formerly gave, viz., to have all the stumps removed; upon which she replied, that she had had so many removed on that occasion, and as she had suffered a great deal of pain, she thought it would do no harm to allow these two to remain. She at once had them removed, and her recovery was as rapid as it was satisfactory. Mr. James Salter relates a somewhat similar case, and quotes another recorded by M. Robert,* in which suppuration extended to the shoulder and upper part of the breast, followed by death; and in which "it was shown that the suppuration had originated at the angle of the jaw, immediately in contact with the decayed wisdom tooth."

There are conditions, however, which, stopping

* "Conférences de Clinique Chirurgicale," p. 145.

short of the formation of matter, may prove formidable enough, which equally require the surgeon's careful attention and the early removal of the offending tooth.

Two cases of a most interesting character will illustrate my statement.

Some few years ago I was asked to see a patient suffering severely from supposed disease of the right eye. He was suffering excessive pain. The right eyeball was so much protruded that the lids could not close over it, and in consequence of the exposure the cornea was becoming hazy and opaque. The eyeball itself was not very vascular, the pupil was widely dilated, and sense of vision entirely gone. I could not detect any disease in the eye itself to account for this protrusion. I carefully examined the orbit, but could not satisfy myself of the presence of any growth, nor could I feel anything like fluctuation from cyst or abscess. It occurred to me that some extraneous mischief might possibly account for the protrusion, as there was nothing in the condition of the globe or the orbit to explain it, the dilatation of pupil and loss of sight being probably due to the mechanical pressure on the eyeball and the stretching of the optic nerve. I made a careful examination of the bones surrounding the orbit, with a view to ascertain if any ossific implication might explain these conditions. On passing my finger down the side

of the nose, the patient winced when it reached a point midway between the inner canthus and angle of the mouth. I immediately suspected a tooth might account for this, and on examination of the mouth found a stump in the upper jaw on the right side, and a molar next it which had been stopped. He made no complaint of toothache. It appeared to me almost too hopeful to expect that these defective teeth could possibly be the cause of such serious mischief; but as an operation had been suggested for the condition of the eye, it was agreed that these teeth should be first removed before any other operative measures were had recourse to. The following day Mr. Vasey removed both stump and stopped tooth. The fangs were inflamed and thickened, but there did not appear to be sufficient to account for such an amount of mischief.

The result was most satisfactory; pain immediately commenced to subside and the protrusion to diminish. At the end of a week the patient was able to close the lids over the cornea, and the latter entirely recovered its natural lustre. At the end of a fortnight it was difficult to say that there had been anything the matter with the eye, except that the pupil was still somewhat dilated, and insensible to the stimulus of light. Subsequently, though vision was not restored, the pupil acted properly in accord with that of the sound eye.

Some two years subsequently to this attack the patient called on me, and stated that he had pain at the back of the left orbit—the opposite side, and as he was about to be absent from England for some time, he wished my advice on this point. He now mentioned to me that some time prior to the attack in the right eye he had distinct recollection of pains at the back of the right orbit, but that, as they were not very severe or persistent, he paid no further attention to them. On looking into his mouth, a decayed molar was seen in the upper jaw on the left side. This was removed with perfect relief to the orbital pain, and the patient has had no further trouble in this respect. Mr. James Salter has published a very interesting case of amaurosis, consequent on acute abscess of the antrum, produced by a decayed tooth, in a communication to the Medico-Chirurgical Society,* in which he did me the honour to refer to the case just related.

Another case, but less serious in its consequences, occurred to me three years ago. A lady residing in the South of France became subject to acute neuralgic pains about the right orbit and side of the head. This was gradually followed by some general thickening of the soft tissues below and around the inner margin of the right orbit, and gradually spreading outwards. There was

* "Med. Chir. Trans.," vol. xlv. p. 355.

also decided prominence of the globe when I saw her, a few months after the commencement of these symptoms, some slight double vision at times, and much headache. I could observe nothing in the condition of the eye, or the contents of the orbit, to account for the slight prominence of the former beyond the general vascularity and the chronic thickening of the soft tissues, with slight periostial enlargement of the inner halves of the margins of the orbit. On examining the teeth, a molar in the right upper jaw was seen to be defective and discoloured, and in front was a stopped bicuspid. By my advice the molar was removed by Mr. Normansell, who then recollected that he had drilled the body of this tooth some time previously; the aperture was still patent, and the tooth appeared defective and discoloured.

The result, though partially beneficial, was not entirely satisfactory; the patient still complained of some pain, and suggested the removal of the stopping from the other tooth, as she thought it rather sensitive. This was done, and now steady, gradual improvement took place, and the patient has remained well since, with perfect recovery of vision.

A dentigerous cyst will occasionally be the seat of suppuration. A patient was admitted into St. George's Hospital under my care a few months

ago, with an enlargement of the lower jaw on the right side, which, on examination, appeared to involve the substance of the bone. All the teeth (the three molars) over it had been removed previously to admission. On examination of the mouth, a small orifice, from which pus exuded, was observed in front, between the cheek and the gum, and in the floor of the sulcus; a probe passed readily into a large cavity, but no bone or exposed tooth could be felt. The sac was freely laid open inside the cheek; the finger was passed into the cavity, which was felt to be lined by a smooth membrane, but no exposed bone or foreign substance could be felt. The cavity was dressed in with lint dipped in a strong solution of sulphate of copper. It rapidly diminished in size, and was gradually filling up when the patient returned home.

The cases related are of sufficient importance, I trust, to justify the time taken up by their description; and, I think, indicate fairly the very great necessity of attention being early given to the state of the mouth in all cases of ulcers, sinuses, or swellings in the neighbourhood of the jaws. I would almost go the length to say that very few are the ulcers in this situation which have an independent origin; but that they are, in the greater majority of cases, due to defective teeth and subsequent alveolar suppuration.

As to treatment I have but a few words to say, and it agrees entirely with the advice given by Hunter, Fox, Bell, Tomes, and Salter. The rule is as simple as it is certain in its effects; the tooth or stump must be at once removed. In many cases I have seen the removal of the tooth sufficient to evacuate the matter locked up, and would recommend this to be done always in the first instance if possible. When, however, this operation does not effect the purpose, and the abscess has not made for itself any other outlet, it should be at once freely incised within the mouth.

The removal of the tooth will not, however, always prevent an abscess, once started, from becoming troublesome subsequently. In a case in which I was lately consulted, the offending tooth had already been removed—a molar from the right side of the lower jaw. But much induration remained about the outer surface of the bone. The patient was a young lady in rather delicate health; and though a free incision was made between the cheek and the jaw, matter continued to collect, and ultimately presented externally, and was obliged to be let out by means of a small external puncture. This soon closed, and the patient experienced no further annoyance. When a sinus has long been permitted to exist without the extraction of the tooth it is very apt to continue to discharge long after the removal of the

offending tooth. It becomes lined by a semi-cuticular membrane, and if fluid be injected it, will run into the mouth. Mr. Bell has recorded an interesting case of this kind, and I have quite lately seen one in which the patient used cotton-wool to plug the orifice. In such cases it is best at once to freshen the edges of the puckered opening and bring them together by fine silver sutures, an operation usually followed by direct and permanent closure of the sinus.

I have met with a few cases in young persons in which a cyst has formed at the bottom of a defective tooth, and which, on being laid open, has disclosed the apex of the fang projecting into the cavity. On the removal of the tooth, this point has been found carious. The cyst has always contracted and filled up after the removal of the tooth.

I look upon these cysts as differing in character from those known as dentigerous cysts, and as dependent on a necrosed condition of the fang. Tic-douloureux, or neuralgia, is, I believe, frequently to be attributed to the presence of decayed teeth, and such instances go to prove how indefinite in position and intensity are the pains dependent on such causes.

In conclusion, I would only add that the cases which have been related teach us this lesson—that in all instances of abscess or ulcer in the

upper or lower maxillary regions, in certain cases of discharge from the nostrils, or in pains about the orbits, with defective teeth in the jaws, it is always best at once to have recourse to their removal; acting on the simple principle that it is best to clear away any doubtful point in the treatment of a case before recourse is had to any other measures; for the maxim of "an empty house is better than a bad tenant" applies equally to surgery as to commerce.

## Discussion.

Mr. Moon said, amongst the various causes mentioned by Mr. Pollock as leading to the formation of pus in the jaws, and the evil consequences following such formation, they did not hear of that due to rupture of vessels at the end of the root. Mr. Salter had said, when a tooth had the nutrient vessels ruptured, very generally the pulp was absorbed and alveolar abscess was not the result. He believed, however, that much more frequently than otherwise, alveolar abscess would result sooner or later where the pulp was dead and no vent was given to the product of the pulp which was decomposed. Another cause of the formation of pus in the jaws was the putrefaction of teeth, and inflammation resulting from that condition. Among the serious results he should be very loth if one case that occurred not long ago at Guy's was not mentioned, where Dr. Goodhart traced on the post-mortem table the cause of death to alveolar abscess about the lower molar. The tooth was decayed and an abscess occurred at the root : suppuration in the dental canal, and periostitis of the left side of the lower jaw followed. Suppuration passed to the orbit, the patient having come into the hospital for abscess in the orbit ; periostitis of skull followed, pyæmia, and death. This case had been reported in the medical papers, and amongst a society of dentists it ought to be made a special point of. The question whether alveolar abscess in many cases being overlooked was the real origin pyæmia, was naturally worthy of their consideration also. The alveolar abscess forming and pus finding its exit externally, the mischief having occurred within the bone, the periosteum was often raised from the surface of the bone, and if they passed a probe from the outside, the probe would come down upon bare bone. The question arose, would necrosis of the bone follow ? He believed, where it was bare periosteum through alveolar abscess, they might say certainly necrosis would not follow if escape were allowed to the pus. Immediately the pus was

evacuated, the bone recovered itself, and this especially applied to such bones as the jaws, which were vascular. Then he must differ—though, of course, it was the safest mode of treatment—from the practice of extraction in all these cases; especially in the upper teeth; simply giving vent to the products of decomposition in the pulp-chamber or in the abscess at the end of the root, was sufficient, and that vent might be given by keeping patent a canal running down the root of the tooth. A case of alveolar abscess which opened into the nares, and which, both by its local and constitutional effects, had assumed serious proportions, was immediately cured by opening up the root-canal and keeping that patent. It might be either kept patent by drilling into the root-canal and syringing, getting the abscess into a healthy condition and likewise the interior of the pulp-chamber, and leaving the opening in such a condition that it would not become blocked; or a tube might be inserted up the root, and so the most perfect ventilation be provided to the abscess-sac. Such a root which had been the subject of extensive alveolar abscess might support for a long time the crown of a tooth with perfect comfort and absolute safety, for he believed it was the real cure for alveolar abscess when the tooth was in the upper jaw.

Mr. Charles Tomes said the case mentioned by Mr. Moon reminded him of another, which, although on record some time, was not very well known. Wedl, in his "Pathology of the Teeth," records a case of abscess dependent on some lesion of the lower teeth. The matter having made its exit through the walls of the alveolus, burrowed out between the periosteum and the bone, and ran up as far as the condyle. Thence it made its way up to the base of the sphenoid, and bathed that in pus, and some portion of the pus found its way into the interior of the skull, and caused death. That was one of those cases where matter formed originally in connection with the teeth had travelled very far, and produced very serious consequences. He echoed Mr. Moon's protest—if protest it be called,—against extraction of the teeth being in all cases necessary. In a case of abscess of the antrum, for instance, in nine cases out of

ten, perhaps, they would do the best thing for their patient by removing the tooth and enlarging the opening, already probably existing, between one of the roots of the teeth and the antrum, and so clearing it out. But it was quite possible to treat a case of abscess of the antrum without sacrificing the tooth, and without making any other perforation. He had seen in New York a case of abscess of the antrum of seven or eight weeks' standing, in which the discharge into the nostril was so offensive that people could hardly stay in the room with the patient, which was treated without the extraction of any tooth or the perforation of the antrum elsewhere. In that particular instance the abscess of the antrum depended on alveolar abscess at the root of the second bicuspid. It happened the second bicuspid had a short straight root, and a round and tolerably patent canal, and the practitioner, Dr. Bogue, enlarged the root of the bicuspid, drilled up it, and then syringed various disinfectant lotions into the antrum. It happened that in that particular case the opening into the nose was large and patent, so that he was able to thoroughly and effectually syringe out the antrum. Of course, in some cases of abscess of the antrum, where the opening into the nose was not so free, one would fail, as he had himself failed, in endeavouring to treat a case in a somewhat similar manner. Though in the case he was treating the opening into the antrum was through the palatine root of the upper molar, he endeavoured to get on with a very small opening, only admitting a No. 1 gum elastic catheter. He washed it out most patiently, but after continuing the treatment of the case for a month without the smallest amelioration, he made an opening with a full-sized trochar, and very speedily brought about a better result. There was another little matter that was of some importance in forming the diagnosis in the first instance. There was sometimes rather extensive mischief dependent originally upon alveolar abscess, in which the tooth itself—the original source of the evil—had become healthy, for the time being at all events. He had himself seen such a case not very long ago. The patient was suffering exfoliation of the plate of the alveolus in the lower jaw from the region of the bicuspid

back to the wisdom tooth; not very extensive exfoliation, but pieces about half as large as the nail of one's little finger kept necrosing. There did not appear to be anything at all the matter with any tooth, and the teeth all stood percussion perfectly well. He was rather at a loss to account for it, and was unable to connect it with any particular tooth. After a time the patient returned with alveolar abscess over the root of one of the bicuspids; and then, for the first time, she mentioned that in the first instance she had a bad alveolar abscess over that same biscuspid. The exfoliation was still continuing, very small pieces coming away, not more than one-tenth of an inch square. He set to work to treat the alveolar abscess by opening up the tooth, which had a filling in it, and got it comparatively well; but still the exfoliation kept on, and at last he extracted the tooth. He found when it had been originally filled the practitioner had enlarged the root canal to a considerable extent, but the root not being perfectly straight, he had gone out on one side. The case was instructive simply from this one point of view, that the tooth which was the original source of evil had got so comfortable and quiet, and apparently so healthy, that there was nothing to lead one to suspect that it had anything to do with the disease; and yet the disease, which ran on something like eighteen months, was immediately arrested by the removal of the tooth. He did not believe, but for the patient's subsequent admission, that she had had an alveolar abscess over that tooth once before, any one could possibly have been led to suspect the tooth.

Mr. Alfred Coleman said they must all feel extremely indebted to Mr. Pollock for the valuable and interesting paper with which he had favoured them. More especially valuable was it as coming from the surgical side of these questions. Cases similar to those mentioned by Mr. Pollock had come before them, but the difference might be this—that a patient applying to a member of their body as a special practitioner, whatever the complaint might be, say, *fistula in ano*, they would very naturally look at his teeth, and if the teeth had anything to do with it, they might find some carious teeth or

some roots which they would remove, and take very great credit to themselves for the success which might attend the operation. But it was somewhat different when the patient applied for advice when the lesion was apparently at some distance, and having nothing immediately to direct attention to the spot from which the evil arose. Therefore, a much greater amount of credit was due to those whose attention was first directed to distant organs, and eventually by care found out the true cause of mischief seated in another part of the body and often at some very considerable distance. Amongst the cases Mr. Pollock had brought before them none, were more interesting, because more troublesome and obscure, than some of those cases of abscess which occur from misplaced or impacted wisdom-teeth. Every now and then these cases were brought before them, and they frequently presented very obscure symptoms. There was at present in St. Bartholomew's a patient admitted with symptoms apparently pointing to some tumour existing in the brain. On the left side of the neck there was a hard swelling, no doubt pressing on the common carotid, probably the vessel at and above its bifurcation. It appeared to one of the house-surgeons that this might probably have a dental origin. A tooth, apparently sound, was removed—the second molar on that side. It turned out to be necrosed, and the membrane infiltrated with purulent fluid. The operation was only performed recently, and they had at present no direct result. It would, of course, be a very interesting case, if it should turn out that the whole of this apparently very serious mischief was so trivial in its character, and had been caused by a defective tooth. An extremely interesting case of impacted wisdom-tooth came, some few years ago, under the notice of Sir James Paget, in which a patient had been for twenty-four years treated for necrosis of the jaw. On one occasion the jaw had been trephined in the hope it might prove to have been a circumscribed abscess of the bone, and give relief by allowing the matter to escape. Sir James Paget fancied he felt something three-quarters of an inch below the surface that was harder than a portion of necrosed bone would be, which felt like enamel. That opinion appeared to be the

correct one, and without very great difficulty that tooth was removed, and the gentleman perfectly recovered. He repeated, that they must not take too great credit to themselves when they met with these cases dependent upon the teeth, but perhaps they should take discredit to themselves in the same degree when they found cases coming before them in which they were led to believe the teeth were in fault, when, perhaps, the fault might be in another part; such a case as necrosis of bone, in which the pain was in the first place referred to the teeth, in which they might remove the teeth from their looseness and causing pain, and then find out, after all, the whole of suffering had been due to necrosed bone. Probably they did quite right in removing the teeth, but at the same time they might have done wrong, or, at all events, have arrived at a very wrong diagnosis in regard to the case.

Mr. Gaddes said Mr. Pollock had spoken of alveolar abscesses being superficial and deep-seated, the deep-seated travelling in different directions. He wished to ask Mr. Pollock if he agreed with Mr. Salter as to the causes of alveolar abscess opening externally.

The President said he was interested in the remark quoted from Hunter's work as to the abscesses depending on canine teeth. He had seen a great many of them, but they had arisen from the bicuspids and molars, but not from the canines. Any observation of Hunter's was worthy of attention, because he was so truthful in all his statements, and therefore must have had some reason for making that remark. Still, having seen a great many such cases, he (the President) could not remember one in which the canine tooth caused the disturbance.

Mr. Sewill said there was one case recorded in the "Transactions" of the Society by himself, of abscess in the canthus of the eye which assimilated very closely to lateral fistula. It occurred in the case of a young patient at St. Mary's Hospital who had a constant discharge of pus from the opening for many months. Extraction of the canine cured that case.

There was disease of the tooth. He did not intend entering upon the discussion, having nothing to add to it, except that he might recall the recollection of the Society to some cases he related some years ago, which by accident came under his care at Charing-cross Hospital. They were cases in which enlargement of the glands of the neck had taken place, very closely simulating scrofulous disease. In one remarkable case, that of a young lady, the disease was cured by the extraction of a decayed tooth. She had been treated for scrofula a long period, and all the usual remedies were applied. Those cases, perhaps, would explain some of the instances of suppuration of the neck. Some of the cases in which extensive suppuration of the neck had taken place might, perhaps, prove secondary, *i.e.*, the abscess was not an alveolar abscess ; it might be a suppurating gland, suppuration being set up by absorption of the matter through the lymphatics, just as in other parts of the body. There was one point which ought to be more dwelt upon in ordinary books, because no doubt the public, and, perhaps, some members of the profession, laboured under an error : that point was, that if it was necessary to extract the tooth no harm could arise from the extraction. The popular belief was that if a tooth was extracted when suppuration was going on, harm would arise ; and especially in hospital practice, patients would tell the same story, that they waited until the swelling went down. The fact was, very often, while the swelling was coming up and going down, a fistulous orifice externally was formed, or they might have necrosis of the jaw ; whereas if the cause of the disease were removed at once, the whole mischief would subside. He believed the cases in which there was little pain were those in which, owing to previous attacks of toothache, the pulp of the tooth had been destroyed. In some cases the inflammation extended to the alveolus, and they had alveolar abscess at once, and then the patient had a clear history of toothache. Perhaps necrosed roots had been lying in the jaw for years, suppuration came on slowly, and the patients were unaware of the existence of the roots. He was very strongly of opinion that chronic alveolar abscesses and roots, surrounded by suppuration and inflammatory thickening, were the origi-

nation of a certain number of cases of tumours of the jaw. No doubt, many of these cases went on for years, and they got tumours which certainly would have been cured had the cause been discovered and removed at an early stage of the disease.

The PRESIDENT said the great value of Mr. Pollock's paper consisted in its drawing attention to the fact that necrosed teeth at times gave rise to such serious mischief. They were all, of course, thoroughly interested in preserving everything, and resorted to various operations, devitalizing the teeth preparatory to stopping them. A series of cases like these would teach them to think seriously of these operations, seeing that occasionally they might lead to such serious mischief as that case in which the gentleman lost his sight simply through the stopping of a molar tooth.

Mr. TURNER said some interesting remarks had been made in reference to Mr. Hunter's observations as to the depth of the fangs of teeth influencing alveolar abscess. The importance that Hunter attached to the position of the fang was not so much to their length as to their relative position to the mucous membrane uniting the cheek with the alveolar process; that the fangs rise beyond the mucous membrane uniting those two bodies, and therefore, when there was any disturbance, they were more likely to have alveolar abscess burrowing outwards. With reference to the canine teeth, they found, although the fangs were long, they were not in that predicament. If the fang rose very highly into the alveolar process, so did the contour of the mucous membrane of that portion of the lip,—it rose as high, if not higher than the apex of the canine fang. Therefore, on those very grounds, and for Hunter's reasons, they would not look for an abscess such as he described. Besides, it was common for abscesses from the fangs of canine teeth to find a passage into the nares; it was much easier for an abscess to find a passage in that way than to find a passage outwards. Some remarks had been made by Mr. Coleman about dentists being liable to mistake certain diseases to which

their attention might be called, and think that they arose from fangs of teeth, when really they arose from other things. He was some year or two ago called upon to remove some roots and to perforate the antrum for a lady supposed to be suffering from disease of the antrum. She was suffering from nothing of the kind. She had what appeared to be a chronic condition of inflammation of the nasal membrane, and she got no relief from opening into the antrum. She had to be treated for chronic roseola, and had that peculiar appearance of the face which often belonged to persons with that disease. She had the tightness of skin which very often was found, and that peculiar flushing, varying in intensity, which was observed extending from the cavity between the orbits up over the frontal sinuses. That was a case which was approached with a considerable amount of confidence, and the roots removed, and the antrum perforated with every prospect of success; but the treatment was an utter failure, though the roots were such as might, according to all the probabilities, have been the source of the disturbance. Dentists were very frequently called upon to remove teeth for these obscure diseases, when frequently they need not be sacrificed; and there were very few of them who had not been able at times, in healthy subjects, to save teeth which, without any attempt in bygone times, would have been at once removed. At Middlesex Hospital he met with a strong, healthy man, who had evidently been trying to break a piece of string, and had ruptured the vascular connection of his tooth with the main artery. An acute attack of inflammation resulted in an abscess, which perforated the lower jaw. The sinuses pointed immediately behind the rim of the lower jaw, having a nasty cauliflower excrescence around it and the tooth; the lower incisor was loose. The abscess was injected frequently, and ultimately the tooth became firm. All offensive discharge ceased, and the abscess healed of its own accord. The tooth seemed to regain, he would not say its vitality, but its firmness, and looked a useful tooth. In another case, an alveolar abscess pointed simply in front of a lower incisor. This occurred in the case of a young man, house surgeon at Middlesex Hospital.

He drilled into the fang. Seeing him in five years' time, as the tooth had given a little trouble, he drilled into it again, reopened the hole, which was smaller than when he had made it. A year or two after that he saw the patient, and the tooth, a lower central incisor, was still doing good service. So that, although they had to sacrifice teeth sometimes, they must at other times take credit for being able to save them, even in the face of alveolar abscess.

The PRESIDENT said, that from what Mr. Sewill and Mr. Turner had said about his remarks with reference to Hunter's observations, he feared he did not make himself quite understood. He did not desire to imply that cases of perforation through the cheek from canine teeth never occurred, but that having seen many cases, he had not seen one of that kind. Abscesses from canine teeth he had seen in large numbers, but not with a perforating sinus through the face; whereas John Hunter spoke of them as if they were very common indeed, on account of the length of the tooth.

Mr. HEPBURN, jun., mentioned a case as illustrating the importance of these cases. A man visited the Dental Hospital some months ago with a very large and brawny swelling on one side of the neck, extending from the ear to the clavicle, excessively hard and brawny. The mouth was firmly closed, and he was unable to take nourishment. Of course, the teeth were suspected of being the cause of that swelling, but it was at that time quite impossible to examine him, the mouth being so firmly closed. The case illustrated the great use of the screw sketched in Mr. Salter's book, because they were able to open the mouth to such an extent as to admit the tip of the fore finger, and with great difficulty they detected a second lower molar, which was really so loose in its socket that it might have been taken out with the fingers, although the other teeth were exceptionally strong and large. So loose was the tooth, that with some curved instrument they were enabled to drag it from the mouth, and found the fangs bathed in pus. In a few days the mouth had opened a little

more, and on further examination they found the lower wisdom-tooth on the right side of the lower jaw completely embedded in the substance of the gum and bone, and bathed in pus. With very great difficulty they removed that tooth, and then recommended him to go to a general hospital, for it was necessary to make external incisions, and that he should be kept indoors. The result was that he died a short time afterwards. This illustrated very strongly the importance of these cases. The swelling evidently originated with these teeth, and the result was death, though from what cause he could not inform them. He also wished to take exception to the remark made by Mr. Moon, that they did not get necrosis of bone, although bone could be felt in probing these sinuses. One or two cases he had met with had led him almost to look for necrosis to a certain extent where the periosteum had been separated from the bone for any considerable length of time. One was that of an engine-driver, a strong man, but exposed to night air and liable to attacks of cold in his front teeth, which were very bad; he came one day to the hospital with one of those large swellings frequently found in the palate, evidently springing from an incisor very much decayed; by its side was a lateral incisor, of which only the root remained. Both teeth were removed and the swelling lanced, when they could distinctly feel a large surface of dead bone. The discharge did not cease for many weeks, until one day he was able to take away a very large piece of the palate—a portion of palate-bone which backed the four incisor teeth. This coming away, the man was cured immediately.

Mr. Moon explained that he quite concurred that necrosis might follow if the case were neglected and the periosteum remained separated from the bone for any length of time; but when such cases were treated sufficiently early, they need not expect necrosis in the same way as they would where the periosteum separated from the bone from a different cause.

Mr. Pollock thanked the members of the Society for the kind manner in which they had received his communication, and could assure them that he had learned some things from the

discussion that he was not formerly aware of. He had looked at teeth merely as a surgeon and not as a dentist, and did not think them of quite so much value under the circumstances as many of them apparently did, seeing that they were sometimes such very troublesome customers. Perhaps he should modify his practice a little, and send for some of his friends to drill their teeth rather than have them extracted. He might mention that in one really very serious case to which he had alluded, in which a lady's eye was prominent, and there was occasionally double vision,—a very anxious case,—the tooth had already been drilled. When he first consulted Mr. Newman Sewill about that case, he said he had never met with anything like orbital irritation from a decayed tooth, and would hardly assent to the proposal that the tooth should be removed. He (Mr. Pollock) was rather hopeful that it would explain the mischief, and at last Mr. Sewill consented, because the tooth was discoloured, and then, having removed it, he recollected perfectly, and there was the hole to prove it, that the tooth had been drilled in order to relieve the previous discomfort.

With regard to Mr. Salter's views as to deep-seated abscesses, he (Mr. Pollock) must reply that he had nothing to do with the dentinal formation. He simply spoke as a surgeon, and really did not go into the pathology of alveolar abscess. He took for granted all that had been written and said about it, and bowed with submission to their opinions. He did not at all enter into the pathology of the causes, and should be averse to giving an opinion, because the cases that came before him did so surgically, and he had taken advantage of his friends who practised dentistry to confirm the opinions he had arrived at as to the necessity of removing the teeth. It was very important, not to the dental profession, but to the medical profession, that the subject should be more fully understood, for the error was made by the medical profession, and not by the dental profession, in the want of attention to these cases. It was with that view he had ventured to bring this subject before the meeting.

The thanks of the meeting were given to Mr. Pollock, and to the gentlemen who had made Casual Communications, and the meeting was adjourned.

# GENERAL MONTHLY MEETING.

*December 4th*, 1876.

CHARLES VASEY, Esq., President, in the Chair.

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The Minutes of the previous Meeting were read and confirmed.

Mr. Hatfield and Mr. Reboul were appointed to audit the accounts of the Society.

The following gentlemen were elected Members of the Society :—

Sir James Paget, Bart., F.R.S., &c. &c., Honorary.

Wm. Scovell Savory, Esq., F.R.S., &c. &c., Honorary.

Herr Karl Wedl, Professor of Pathology at Vienna, &c. &c., Honorary.

Mr. John Carteigh, Jun., L.D.S., 81, Mornington-road, Regent's-park, Resident.

Mr. Robert Hall Woodhouse, M.R.C S., L.D.S., 1, Hanover-square, Resident.

Mr. Matthew Finlayson, 161, Constitution-street, Leith, Non-resident.

Mr. Wm. Bowman Macleod, 43, George-square, Edinburgh, Non-resident.

Mr. Malcolm MacGregor, 20, Queen-street, Edinburgh, Non-resident.

Mr. Charles Matthew, 59, Queen-street, Edinburgh, Non-resident.

Mr. James Edward Murphy, L.D.S., 2, St. James-street, Derby, Non-resident.

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Mr. Moon said he wished to make a statement with reference to the discussion which followed the reading of Mr. Pollock's paper at the last meeting. At that discussion he (Mr. Moon) unwittingly misrepresented the views of a distinguished authority on dental pathology. Speaking on that occasion, he was under the impression that Mr. Salter considered that diseased action external to the tooth did not generally follow the fatty decomposition which he had shown that the pulp of a tooth underwent when devitalized in an unopened chamber. By reference to the chapter on "Necrosis" in Mr. Salter's last-published work, it would be seen what a complete misapprehension that was, and he expressed very deep regret for the mis-statement; a regret all the greater, inasmuch as the misrepresentation was with reference to the views of one who had always been most kindly ready to give him professional instruction.

Mr. Blaise, of St. James's-street, exhibited an actual cautery which had the advantage of being kept at any heat for any length of time. At present the instrument had not been constructed for the use of dental surgeons but rather for ordinary

surgical operations ; it could, however, be made applicable for dental purposes.

The PRESIDENT said that for those who approved of the application of the actual cautery this was a very ingenious and safe mode of applying it.

Mr. MOON said he had seen this mode of applying the cautery used in a case of extirpation of an epulis, and it answered admirably—much better than the ordinary form.

Mr. WEISS made the following communication :—

MR. PRESIDENT AND GENTLEMEN,—

Before proceeding with the casual communication I have announced for this evening, I would like to direct your attention to a very interesting case of swallowed artificial teeth, the particulars of which I think of so much interest as to merit their being brought to the notice of this Society. Such cases are very seldom recorded, partly from the rarity of their occurrence, and partly from the disagreeable associations that connect themselves with accidents of this character. It is very desirable that such details should be published, and I think I shall be able satisfactorily to prove that in both the instances I have to record, the cause of the accident has rested with the patients themselves.

The first case occurred in the practice of Mr. Joseph Blackstone, of Gloucester-road, Regent's Park.

Mrs. T., æt. about 33, accidentally swallowed the small gold plate, with mineral block of two teeth, I now exhibit. She swallowed it while endeavouring to take a pill, an operation attended in her case with much nausea. It was followed by great pain in the region of the cardiac orifice of the stomach ; and the patient, finding that the teeth had disappeared as well as the pill, took a quantity of mustard and water as an emetic, which only aggravated the symptoms. Nausea and inability to swallow solids followed, attended with fever, great prostra-

tion, and a continued sense of indigestion. On the ninth day an œsophagus tube was passed down the throat in the presence of Mr. Pollock, and it appeared to strike the teeth and force them through the opening leading into the stomach. This is in a certain sense conjectural, but it was followed by great relief, which, however, did not last. Much pain was felt in the left shoulder, vomiting was persistent, and the patient became greatly emaciated, so that the operation of gastrotomy was seriously entertained, as the life of the patient was endangered. Happily, on the 117th day after the accident, while the patient was endeavouring again to take a pill (the same operation that caused her to swallow the work), she vomited with more than usual violence, and threw up the teeth. Almost instantaneously she began to recover, and under the care of Mr. Blackstone was speedily restored to health. I am sorry that the time usually given to casual communications will not permit us to dwell longer upon this most singular accident. The work remained in the stomach 117 days, and was returned precisely in the state I now exhibit it to you.

The second case I would direct your attention to is also a very interesting one. The patient, Mr. T. D., had but three teeth remaining in the upper jaw—one central and two lateral incisors,—therefore the denture was nearly a complete one, and had been worn for many years. Originally a molar tooth stood at the back, but when this dropped out, the space was filled up with vulcanite. It fitted the mouth fairly well, and could not be removed merely by the action of the tongue: any spasmodic effort, such as coughing or sneezing, might dislodge it, but not otherwise.

The patient retired to bed a little after 11 o'clock on the night of the 30th of July last. It appears that he sometimes took the teeth out upon going to bed, and sometimes allowed them to remain in the mouth. He awoke a few minutes after twelve with a feeling that he was being suffocated, and jumping out of bed in great agony, his first impression was that he had been attacked with some description of convulsion, and he desired his wife to send for their usual medical attendant, Dr. Slaines, of Bloomsbury-square ; but that gentleman being out

of town, his assistant thought it best to call to his aid the nearest medical man he could find; and upon their arriving, the patient was found to be in a very anxious state; but his symptoms were attributed to a spasm of the glottis, and the idea that he had swallowed his teeth was not entertained. The patient would not believe that the teeth were in his throat, but after a fruitless search for them for nearly two hours, Dr. Slaines's assistant, who had remained with the patient all the time, determined upon calling in a surgeon, and at half-past five he returned, bringing with him Mr. Royes Bell. I am able to furnish you with Mr. Bell's report, which is so complete that any addition of mine is hardly needed.

### Report of Mr. Royes Bell.

"I was called at about half-past five on the morning of the 31st July last, in Mr. Henry Smith's absence from town, to see Mr. T. D., who had been taken seriously ill during the night with difficulty of breathing, &c. I found a gentleman, aged about fifty, sitting in a chair with his mouth slightly open, and a quantity of saliva tinged with blood flowing from it. He could speak but imperfectly, and in a very low voice. His face was a good deal congested, and he seemed to be in great distress from difficulty in breathing and from choking. The history given to me by Mr. Bottdrell, the assistant of Dr. Slaines, was to the effect that Mr. D. retired to rest quite well, but awoke suddenly in a fit of choking and difficulty of breathing, and that he had gone to sleep with a large upper set of teeth in his mouth. This set was now absent, and as it was not to be found in the bed or elsewhere, it was justly concluded that the symptoms were due to the presence of the teeth in the gullet, and I was sent for. On passing the finger down the throat, the teeth were felt just beyond the effectual reach of the finger thrust down the throat as far as possible; and as the attempt increased the patient's distress, I desisted. His residence being near King's College Hospital, I went there, and obtained the assistance of Mr. Roberts, the house-surgeon, who kindly came at once with me, bringing suitable instruments.

"Upon examining a duplicate set of teeth,* we found that the shape of the gold plate helped us very materially in our efforts to extract it, as it was curved at the back part. I passed a pair of œsophagus forceps (which opened from before backwards) down, closed, and using them as a sound against the metal plate, got correct information as to the exact position of the plate, which had been slightly shifted by the attempt to get my finger under its front margin; this edge being depressed, and the back part elevated. Opening the forceps, I seized the posterior margin of the plate, and, holding it firmly, brought it up successfully as far as the soft palate, where it stuck; then giving the patient, who had borne my manipulation with great fortitude, breathing-time, I removed the set from behind the soft palate without any further trouble.

"The patient was instantly relieved of his distressing symptoms, and soon recovered under Dr. Slaines's treatment for the soreness caused by the foreign body and the manipulations necessary for its removal.

"It was of great assistance to me to be able to examine the duplicate plate, as by that means I was better enabled to judge of its size, and to take advantage of its peculiarities of shape. Fortunately for the patient and myself, it was regular as regards the teeth; the patient had only three of his own standing, and the work was free from those wire fastenings which cause so much trouble in extracting these bodies, and which fix them often so firmly in the throat. The size of the set was also favourable, as otherwise it might have gone further down the throat, where the œsophagus is narrower, and manipulation rendered more difficult. In extraction it stuck at the soft palate, and it is curious that so large a body managed to pass the irritable soft palate and its excitable muscles. I suppose he was sleeping with his mouth open, and his head placed in a position most favourable for the occurrence of this awkward accident.

"The above adds one more to the number of this class of

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* The size of the piece of work was $1\frac{3}{4}$ inch from back to front, and $2\frac{3}{8}$ inches from side to side.

cases which are at once so troublesome both to the surgeon and the patient, and gives force to the recommendation of the dentist who prudently recommends the removal of false teeth on going to bed, and whenever anæsthetics are administered." *

In conclusion, I may state that the denture was swallowed at about 12 o'clock at night, and not liberated until nearly 9 o'clock in the morning. I have since seen the piece in the mouth, and can testify that it cannot be liberated by the unaided action of the tongue; and I may state that it has been worn for about nine years. The smaller piece of work appears to have been inadequately secured, and I cannot help thinking that it were better that a band of gold were exposed, than run the risk of accidents of this dangerous character.

The PRESIDENT said it was fortunate for the patient when a case of that kind terminated so favourably. He had mentioned to the Society a case that happened at St. George's Hospital, to a policeman. He was stepping off the high pavement in the Brompton-road and fell; being unable to articulate, the people around thought he was in a fit; but on a *post-mortem* examination they found that four artificial teeth had lodged in the œsophagus and caused death.

Mr. BARRETT said the case related by Mr. Weiss was one of the most remarkable cases he had ever heard. In his own practice he had never seen anything like it, and he would be glad to hear from other members of the Society whether they had ever met with such a case. Mr. Weiss spoke of the case as if it was of somewhat frequent occurrence, but he thought it was impossible for a plate properly fixed in the mouth to be

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* Mr. Roberts told me that he saw a case where some teeth with wire attachments had been swallowed, and had passed into the stomach. The patient was ordered to take oatmeal with worsted cut up fine mixed with it, in order that the wool might be entangled around the projecting processes, and the passage of the body through the stomach and bowels facilitated. I consider the suggestion a very valuable one.

removed simply by the action of the tongue. He hoped some gentlemen present would favour the Society with their recollection of such cases.

Mr. Weiss said he commenced his paper by stating that these cases were of very rare occurrence indeed. He might also state that he had seen the patient, and that he had no power to remove the piece simply by the action of the tongue. After an artificial piece had been worn for nine years, they must allow for some changes, and sometimes where there had been further loss of teeth, those changes were not of a favourable character. No doubt the patient should be very severely censured for wearing a piece in his mouth when it became loose, but in this case the patient could not get it out without some convulsive action, such as that of coughing. Mr. Royes Bell took so much interest in the case that he called upon him (Mr. Weiss). He had the opportunity of seeing the piece in the mouth and out of the mouth. He simply stated the facts as brought before him. The gentleman had a very small mouth and throat, and the jaws were not large. He knew that it required some amount of courage to bring cases of swallowed teeth before a society; but, at the same time, if such accidents occurred, it was their duty to bring them forward, however injurious it might be to their own name and fame, in order that they might suggest the best treatment.

Mr. Barrett.—Am I right in supposing that this upper plate was impacted in the fauces of the patient and with difficulty removed?

Mr. Weiss said the plate, when Mr. Bell saw the patient, was so low down that it could only be touched with the finger, and in the act of endeavouring to raise it, its position was somewhat altered.

Mr. Sewill said, as Mr. Barrett had made these observations, it was as well that the fact should be recorded in the "Trans-

actions," that within his knowledge at least six cases of the kind had been mentioned in the "Transactions" of other societies during the last five or six years. At the Medical Chirurgical Society, not many months ago, a case was mentioned by Mr. Little, in which he removed from the stomach, by means of œsophageal forceps, a large piece of work. That case occurred in the London Hospital, and was thoroughly authenticated. On one occasion, at the Medical Society, three or four cases of a similar kind were related.

Mr. HUNT said that Mr. Royes Bell, whose name had been mentioned, might perhaps remember a case that occurred in Sir William Fergusson's practice some years since, in which five teeth, mounted on a gold plate, lodged at the lower part of the œsophagus and remained there, producing more or less distressing symptoms, for a period of six weeks. Sir William Fergusson, with the longest pair of forceps at his disposal, could just touch, but failed to grasp them. What became of the patient he did not know, but perhaps Mr. Bell could give the information.

Mr. CHARLES TOMES said there was another case on record in the practice of Sir James Paget, he believed, in which a full set of upper teeth lodged in the fauces, and remained there for an amazing length of time,—for weeks at all events. In that case it had passed into the fauces during an epileptic fit, and the patient was unconscious of the loss of the plate, and did not tell anybody of it till long afterwards.

Mr. ASHLEY BARRETT mentioned a case occurring in Mr. Maunder's practice at the London Hospital, where a woman swallowed a small gold upper frame, with four or five teeth, which lodged in the œsophagus, about midway between the pharynx and the stomach. Several attempts were made to remove it with the forceps, but all failed. Ultimately, an opening was made in the œsophagus behind the carotid artery; the frame was extracted and the patient made a good recovery.

Mr. Hutchinson said, at the last meeting a regulation case was mentioned in which the use of the rubber dam was named as an effective means for reducing irregularity, and, as he understood it, was intended that the rubber dam should be used for drawing back permanent upper incisor teeth; it occurred to him that he could not do better than bring before the Society a means which in his hands had proved very effectual for that purpose. It possessed this great advantage, that the patient could wear the plate at home, and the visits to the operator need not be more than once in two or three months. That, at all events, was an advantage to the patient, especially when, as in the case to which he was referring, she lived at a distance of some two hundred miles. The plate was an ordinary regulation plate, covering the palate and the molar teeth. In that case the bite required to be stopped because the lower incisors impinged upon the backs of the upper incisors. The first permanent molar and the second bicuspid were capped with vulcanite, the second permanent molar being left uncovered, in the hopes that it would grow down and antagonize the lower teeth, so that when the plate was discontinued the bite might have opened to the same extent as when the plate was worn. To each side of the capping a small gold hook was fastened, and to this a piece of ordinary rubber dam was attached, two holes being punched in it, one at each end, for attachment by means of the hooks. The piece of rubber then passed round the front of the teeth, and to prevent it slipping up the gum, a small hook, bent twice at right angles, was fixed over one of the central incisors, and the slip of indiarubber passed round them. In this way the indiarubber passed round the front of the teeth, and exerted a gradual compression on the whole. The first bicuspid was removed on each side, in order to gain sufficient room for the teeth to go back. He brought the case thus early before the Society because the subject was mentioned at the last meeting. It was not yet completed, but from the models members would be able to see the great improvement which had been effected in three months, and with only two visits to London. He hoped he should be pardoned for stating that this particular way of regulation,

although not his own invention, had proved exceedingly useful; and, having proved its efficacy on several occasions, this had induced him to bring it before them, in hopes that it might prove useful to his brother members, and also that it might induce members of the profession to bring before the Society cases of a similar nature which were rather more than ordinarily difficult, in order that the younger members especially, might have the benefit of the experience of those who had derived advantage from certain methods of treatment.

Mr. Balkwill asked whether, in the case Mr. Hutchinson had described, the lower teeth were also crowded, because in two or three cases of a somewhat similar nature he had found the lower teeth very much so; and the great difficulty had been the pressure of the lower teeth when the plate was taken off. He had adopted the plan of taking out the bicuspid on each side, and pressing out the teeth, so that, instead of biting against the inner side of the roots of the upper teeth, they might bite further down to the crown.

Mr. Hunt imagined that Mr. Hutchinson was taking a case where the teeth had left their vertical position, and were presenting themselves almost horizontally. He had adopted the plan of treatment many times, and could quite endorse the statement of Mr. Hutchinson that it was an exceedingly easy method. There was an advantage both to the operator and to the patient, inasmuch as it was done with very few visits and with very little pain or distress to the patient.

Mr. Charles Tomes wished to say one word with reference to the plan of regulating teeth shown by Mr. Hutchinson. The first person he knew as having used it was Mr. Palmer, jun., of Cheltenham, who had employed it in a great number of cases with considerable success. There were one or two small details in which his plan was decidedly better than that shown by Mr. Hutchinson; for instance, in the manner of attachment of the rubber dam. Instead of a hook, he used two flat pieces

of springy gold tightly pinched together, the rubber dam being strained and slipped between them. Then, instead of the detached hook that Mr. Hutchinson had placed over the central incisor to keep the rubber band down, a better plan was to carry a little wire from the front of the plate, and instead of carrying it over the top of the tooth, where it was in the way, to carry it over a notch between two teeth—between the central and lateral, or the lateral and canine.

Mr. Oakley Coles said that in all cases of irregularity of the character shown by Mr. Hutchinson he strongly objected to the use of indiarubber at all. He believed the fact of the case having been partially successful was strongly against it. In a case of that kind the greater the period over which treatment extended the more likely was the result to be permanent. He used in these cases over the molar tooth a capping of platinum with a hard band passing in front of the incisors. As that pressure lessened, the parent of the child was directed to press it in a little, so as to keep up a constant pressure on the incisors. The patient might be seen once in three or six months, and should go on wearing the plate for three and sometimes four years. They would then get a slow absorption of the bone behind the teeth, and he believed a corresponding deposition of new bone on the outer surface of the alveolus. At any rate, they were not liable to that loosening and periostitis to which they were subject in all cases where remedies were adopted which acted rapidly, although for the time being they might do so very efficiently.

Mr. Balkwill said his experience had been that the quicker the teeth were moved in these cases the better the result in all respects. He believed that even if there were some slight inflammation set up, it was rather a help than otherwise, and he failed to remember a case in which any bad result had followed. He believed that fresh bone was produced in much less than a year or two.

Mr. Gaddes said the specimen which he now brought before

the Society was a first right upper molar, removed from a patient at the National Dental Hospital. The crown of the tooth was quadrate and above the average size. The anterior internal, and the posterior external cusp, were particularly large. The length of the root was not unusual, but its form and cup-shaped extremity, the shape of the pulp-cavity, and the thinness of its walls, were the peculiarities of the tooth. The root, which was oblong in a bucco-lingual direction, gradually diminished in circumference for about one-half its length, at which point it expanded, especially on its mesial and buccal, and, slightly so, on its distal surfaces; the buccal expansion terminating in two short processes, the posterior communicating by a high ridge with the representative of the palatine fang. Formed by these processes, and the ridges connecting them, is a cupped extremity of the root, the surface of which was finely nodular, as seen through a lens, and was covered with a thick membrane. Three foramina were visible, one at the apex of each buccal process, and the other at the end of the more or less distinct palatine root. The pulp-canal, which had been fully exposed by caries, was very large: its outline resembled the contour of the tooth, and its walls in some parts were exceedingly thin. This specimen was the fifth of its kind that was recorded; in the root of each there was a close similarity, and this would indicate formative causes somewhat identical. In Guy's Hospital Reports for this year Mr. Salter described one case; another is recorded by Wedl, and there are two in our Museum, one of which was described by Mr. Charles Tomes in the "Transactions" for May, 1871. He (Mr. Gaddes) asked if their shape at all indicated an erratic trace of a form present or absent in existing or extinct mammals, and now obsolete through modification in man? He had pleasure in presenting the specimen to the Museum.

Mr. Moon said he had in his possession a tooth similar to the one shown. In the case of teeth presenting this form of root, it seemed as if, in the formation of the dental pulp there was withheld some moulding force such as might be exercised by the development about it of the alveolus.

Mr. Sewill did not think that Mr. Moon's explanation could be quite received, inasmuch as the development of the bone followed that of the papilla, rather than the tooth followed the development of the bone.

Mr. Charles Tomes showed the molar tooth of an Indian elephant which had been struck and penetrated by a bullet. This accident, common in the tusks, but never, so far as he knew, before met with in a molar, had caused intense irritation and, probably suppuration of the pulp. At all events the tooth showed on a gigantic scale those absorptions of the hard dentine in contact with the pulp which, on a microscopic scale, sometimes are found round the pulp-cavities of human teeth, where the pulp had been inflamed.*

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* A detailed description, with figures, of this exceedingly interesting specimen, will be given in the "Transactions" for next month.

## *On Treatment and Extraction of the Tooth-pulp.*

By Joseph Walker, M.D., M.R.C.S., L.D.S.

Mr. President and Gentlemen,

It is with great diffidence that this short paper is presented to the consideration of this Society; as the ground is already so well trodden, new matter can only now and then be introduced quite as the exception.

Mr. Turner, our esteemed Secretary, requested a short account of the treatment for Devitalization of the Pulp and Vessels in the Nerve Canal.

With your permission, Sir, we will first treat—

(*a*) On the mechanical preparation of the crowns of the teeth;

(*b*) The treatment of the exposed pulp;

(*c*) The entire extraction of the pulp and investing membrane;

(*d*) When extraction is practically impossible.

(*a*) The mechanical preparation of the crowns of the teeth.

Free use should be made with the enamel-cutter, to give solid walls, and remove overlapping

curves. The walls should be so prepared as to enable the operator to introduce the barbed nerve-extractor perpendicularly into the full number of the nerve-canals. This is effected easily in the central lateral canine and first bicuspid teeth. In the second bicuspid teeth the cavity must be sloped forwards, and a large portion of the masticating surface sacrificed. In the first and second molar teeth the masticating surface must be freely cut away, not only to expose the pulp-cavity, but also the nerve-canals, as in the case of the second bicuspid, to give opportunity to introduce the fine barbed instrument perpendicularly.

Never having attempted to extract the nerve of the dens sapientiæ, or third molar, I will not pretend to explain the necessary preparation, excepting when the crown has disappeared and the pulp fully exposed to view. In cases with approximate spaces, caused through extraction or otherwise of a neighbouring tooth, the operation may be much facilitated by obtaining room by means of introducing indiarubber, cotton.wool, or condensed wood, the wedging process being undertaken with care and slowly effected. The operation in these cases should be deferred for a week.

(*b*) Treatment of the pulp.

This should be varied according to the condition of the exposed pulp.

No. 1. In acute inflammation.
No. 2. In suppurative inflammation.
No. 3. In chronic inflammation.

No. 1. In the acute stage,—

| | |
|---|---|
| Thoroughly levigated arsenic ..... | $\frac{1}{20}$ gr. |
| Creosote ..... | 2 drops. |
| Acetate of morphia ..... | $\frac{1}{10}$ gr. |

This should be introduced on wool or wax into the base of the cavity, and placed directly in contact with the pulp, covered well with cotton-wool, saturated with solution of mastic, and secured with three or four turns of ligature, or sealed with Jacob's stopping. In twenty-four hours the dressing should be removed, and then substitute a plug of wool, the base of which should be saturated with solution of mastic and the apex tipped with fifteen granules of tannic acid and $\frac{1}{10}$ of a grain of acetate of morphia. One dressing will frequently prove sufficient, but occasionally it may be repeated with advantage, especially when more than one nerve-canal is in question.

No. 2. When suppuration has set in, the cavity should be sponged well with solution of carbolic acid. If painful, acetate of morphia should be added to the solution, or tincture of aconite, after which wool with creosote should be introduced into the nerve-canal as far as practical. In twenty hours the use of the syringe may be repeated, and a dressing of creosote and tannic

acid on wool applied. In forty-eight hours a barbed instrument may be introduced, and the cavity be fished by slightly rotating the instrument half a circle, for any broken-up pieces of the sheath of the vessels.

This is a most tedious process in some cases, but must be accomplished, if success is to be the result of the operation. Lastly, with a carefully-prepared instrument (a fine, short broach, with suitable handle, the temper of the steel reduced to a deep blue, and the sharp edges reduced and tapered to a fine point, and roughened, by rotation on a hard piece of wood, with a new gold-file, is one of the best for the purpose). This instrument should be securely enveloped in wool saturated with creosote, rolled so as to fit the canal, and used as a piston of a syringe, applying good force in its introduction and withdrawal for twenty or even thirty times, until the fluid passes through the sinus of the alveolar process at the apex of the fang. The canal may now be cleansed with wool and pure spirit.

No. 3. In chronic inflammation apply the same dressing as in the acute stage, repeating each dressing twice; perhaps the tannic acid and masticated wool may be applied three times with advantage.

This now brings us to

(*c*) The extraction of the pulp, with the sheath and vessels.

In a large number of cases this can be accomplished if only patience and steadiness of manipulation be brought into exercise, by introducing the barbed instrument straight up the nerve-canal, rotating the instrument half a circle, withdrawing it whenever the sense of touch indicates that the sheath is involved. At other times difficulties present themselves, of which the following are a few of the number:—

1. The shape of the nerve-canal of the tooth under treatment, the nerve-canals varying very much in shape, size, and depth in different teeth, and even of teeth of the same class.

2. The shrinking and shrivelling of the sheath and vessels after treatment.

3. The adhesion of the sheath to one side of the canal; frequently this takes place in the central, lateral, and canine, towards the anterior wall; in the bicuspids, towards the posterior wall of the anterior fang, and the anterior wall of the posterior fang; in the molars, towards the centre, leaving the outer circumference of each fang.

Lastly. The curves that various fangs assume.

The introduction of the fine barbed instrument must be governed by the difficulties of the case in question; gentle pressure towards the wall where

adhesion is expected; gentle direct upward pressure when curves are anticipated, trusting to the barbed teeth of the instrument to withdraw the sheath.

Even with these difficulties experience teaches us that entire extraction can be accomplished without pain; and nothing less than this should satisfy the ambition of moderately-skilled operators. It is the surest method to give ease to the patient and attain the future salvation of the dental organs.

(*d*) When extraction is impossible, when suppuration has continued some months.

Much need is there, Sir, for apology in reading this paper to-night.

The only new thought is in reference to the preparation of the arsenic. This drug, to be used so as to produce only slight pain, must be reduced by trituration to a powder as fine as possible, and if so used with care, it is believed, will prove of great service to all friends practising dental surgery.

I beg to offer to you, Mr. President, and the other members of the Society my best thanks for their kind attention given me this evening.

## Discussion.

The President said he hoped they would not allow Dr. Walker's interesting paper to pass without some discussion. He was sorry to say he was himself more a tooth-extractor than a nerve-extractor, and his experience of the latter operation had not been very extensive.

Mr. Moon said it would be recollected that Mr. Pollock at the last meeting mentioned some interesting cases in which disturbance of vision and severe pain in the orbit had been relieved by the extraction of teeth, or by the removal of a stopping from a tooth. Since the last meeting he had seen a case somewhat corresponding to those related, in which the symptoms, though less severe, were evidently tending in the same direction. Three weeks ago a medical student at Guy's came to him, after suffering for five days from severe pain, which he described as being at the back of the right eye, and as increasing in intensity on any attempt being made to read: dilatation of the pupil had also been noticed. His patient wished him to extract a first upper right bicuspid, on which rhizodontrophy had been performed three years previously, after the extirpation of the pulp. Being rather a believer in the operation of rhizodontrophy in certain cases after the thorough clearing out of the pulp-cavity, he naturally looked at the adjoining teeth, and found that decay had penetrated the distal surface of the canine in front, and had reached the pulp-chamber. This tooth had been stopped with amalgam. The stopping was removed, the pulp-chamber opened up, the remains of a dying pulp extracted, and the root-canal filled. The unpleasant symptoms immediately ceased, and have not returned. This case would, perhaps, point to the advantage of sometimes extracting the pulp.

Mr. HUNT said many gentlemen might have noticed the discussion going on in the medical periodicals, which had its origin in a paper read by Mr. Callender, with reference to the treatment of large abscesses by a forcible injection of a solution of carbolic acid. Dr. Walker, in his paper, insisted that where the pulp had been suppurating, and the alveolar wall had been penetrated by abscess, the operator should not be satisfied until he had pumped up sufficient fluid to see it escape externally through the gum. That was a point that must be taken special notice of, because they then got the action of the drug all along the course of the abscess; and it was marvellous to see, even within twenty-four hours, how an abscess would subside and leave but a little cicatrix; and how rapid the healing action was when the sinuses had been well washed out with carbolic acid. He spoke of carbolic acid mainly, because he had more experience of it, and it was a more agreeable thing to use than creosote. It was the same theory as Mr. Callender had broached, and he was glad to see that the surgeons had derived that line of treatment from the dental-surgeons.

Mr. ASHLEY BARRETT said Dr. Walker advised the use of arsenious acid, creosote, and morphia for the devitalization of the pulp. He had always failed to see the advantage of diluting the arsenic to such an extent. Their object was to devitalize the pulp as rapidly and painlessly as possible, and this was to be done by using the arsenic in as concentrated a form as possible. He was in the habit of taking two parts of arsenic, mixing this with one part of soap. That made a very workable mass, and a piece a little bigger than a pin's head was generally sufficient to destroy the pulp in three or four hours. Formerly, when it was mixed with morphia, a longer time was required, and one often failed on the first application to destroy the pulp. Theoretically, no doubt, the morphia reduced the pain, but he could not see how one-tenth or one-fifth of a grain of morphia, applied locally, could produce much effect. He believed the local effect of morphia was nil; it only acted through the system, and such a small amount of morphia could not produce a very great effect.

Mr. Hutchinson said Dr. Walker's paper seemed to open up three distinct points in the application of arsenious acid to the treatment of exposed pulp. In the first place, sensitiveness of pulp might simply cause sensitiveness of dentine; for although they could not prove the distinct connection between nerve and dentine, they must admit that sensitiveness of dentine depends upon the sensitiveness of nerve. Then, secondly, there was the action of arsenic in the destruction of the nerve; and, thirdly, the action of carbolic acid in the treatment of an abscess at the root of a tooth, consequent upon the death of a nerve. In the first place, with regard to the treatment of sensitiveness of the dentine dependent upon sensitiveness of the pulp, a very minute portion of arsenious acid with an excess of pure carbolic acid applied on a little cotton wool and sealed in the cavity, was a most effectual means of subduing sensitive dentine. It was a very old method, and a mixture of an excess of carbolic acid with the arsenic seemed to neutralize the irritant effect of the latter. With regard to the destruction of the pulp, the way of applying arsenic to produce the least pain was to take a small piece of blotting-paper and upon it pour 1-25th of a grain of arsenic in its dry form, and on this to put a drop of Calvert's No. 1 carbolic acid, obtained in the form of crystals. The way to procure it in a liquid form was simply to warm it; in summer it was a solution, but at this time of the year it had to be warmed. On dropping it on to the arsenious acid, it in a very few moments crystallized and formed a small solid pledge, very easily manipulated. This was carried to the tooth, and by the time it reached the place required, it could be applied as a hard mass to the exposed pulp; but the warmth of the tooth would melt the carbolic acid, and the arsenious acid was equally applied to the surface of the exposed pulp. This was absolutely painless both in the case of suppurating nerve or of irritated nerve. If the tooth had been aching before, it would cure the pain, and in twenty-four hours would destroy sufficient of the nerve to open up a free opening into the pulp-cavity. Thirdly, the use of carbolic acid, referred to by Mr. Hunt as curing an abscess at the root of a tooth, was invaluable.

The same form of carbolic acid, perfectly pure (not in a solution in water), was the most useful way of applying it. It acted very effectually in curing abscess at the roots of temporary teeth especially, and in destroying the nerve—pumping the carbolic acid through until it appeared through the sinus on the surface of the gum; this would cure the abscess completely, and the sinus would heal up in a perfectly healthy form.

Mr. Balkwill said he should like some information from Dr. Walker as to what his practice was when he could not get the fluid to readily pass through the apex of the fang. It very often happened it would not go through, and in one or two cases he had drilled a hole right up through the apex, but he believed the fine or sharp edge which was left had proved an irritant, and the cases were not so successful as he could have wished.

Mr. Turner said it was very pleasant to hear of its being possible to extirpate a tooth-pulp without pain. He confessed that sometimes he was unfortunate enough to inflict a considerable amount in his endeavour to do so, and at other times he was very grateful when he found the patient did not suffer, but he could not claim anything like uniform success. He had tried the application of the levigated arsenic, but, he believed, without the creosote, and had had more success in getting less pain than when the usual form was employed. What particular merit there was in the levigated arsenic he did not know, unless it was more readily taken up by the pulp, or perhaps not so rough and likely to act as a mechanical irritant. He should like to know whether Dr. Walker used any special form of creosote. Of course there was a great difference between the action of wood creosote and the creosote got from minerals; the former was generally considered preferable for such objects. With regard to the cure of abscesses, the pumping was the difficulty. If one could manage the pumping, it mattered little whether creosote or carbolic acid was used. The pumping had been the difficulty with him, not what material was used.

Mr. ASHLEY BARRETT inquired whether Dr. Walker insisted on the use of morphia as an essential, combined with the arsenic, for the destruction of the pulp; and, if so, whether he had any theory with regard to its action?

Dr. FIELD said, the extraction of the nerve in that complete form was most admirably done. With regard to the treatment of these three different stages, he should be very glad to know what percentage of cases proved successful. The theories were very nice, but it would be very important if they could have some statistics.

Mr. CHARLES TOMES said, alluding to the desirability of statistics, there was an admirable paper in the "Dental Cosmos" some few years back, by Dr. Jack, of Philadelphia, in which he did give statistics with reference to his extensive success in the treatment of exposed pulps, and the conclusion he came to was that pulps in Philadelphia were very much more obstinate and refractory things to deal with than the pulps which his brother practitioners treated and wrote of.

Dr. FIELD wished to add one word with regard to the devitalization and disinfection of the nerve-canal. A difficulty was found in pumping the disinfectants through the canals. He found very few cases where he could get his acids through. If the nerve-canal was thoroughly disinfected, either by carbolic acid, salycilic acid, or creosote, very few cases would give any further trouble. He believed that it depended largely on the patient, and also largely on the locality.

Dr. WALKER said the principal object of his paper was to show when extraction should be resorted to, and when not. In acute inflammation he used the arsenic, as Mr. Hutchinson had said, as dry as possible. The apex of the wool was tipped with creosote and dry arsenic, and then morphia, which was first presented to the exposed pulp. He had very strong faith in the second treatment, viz. with the tannic acid. He always failed in withdrawing the nerve

entire if he tried to extract after the first dressing. He first dressed with arsenic, creosote, and morphia, leaving twenty-four hours to pass; then he substituted a second dressing with the creosote or carbolic acid, and the tannic acid, and found the action of the tannic acid was to strengthen or render fibrous the sheath, to make it dense and firm. He had one specimen, with the entire pulp and the two nerves of the lower molar, from base to apex, withdrawn after one dressing of the tannin. The mixing up of the subject of alveolar abscess with the extraction was only to show that he had failed to extract whenever there was suppuration going on in the nerve-canals. He found that if he fished for the nerve then, he got it in small pieces. If they wished to plug a nerve-canal when suppuration had been going on, it was necessary to pass the barbed instrument and get, perhaps, the remnant of the sheath at the apex of the root. As to pumping, he found many cases where he could not get the fluid to pass through the sinus, even on the first, second, or third visit; but on the fourth or fifth time the fluid would pass completely through, and then was the time to cleanse and plug. Directly they got a clean canal they must pass wool with pure spirit, and plug at once. This gave less periostitis, less inflammation of the neighbouring tissue, and much greater success in the operation.

The PRESIDENT then gave the thanks of the Society to the various contributors of Casual Communications and to Dr. Walker for his interesting Paper, and adjourned the meeting to January 8, 1877.

# ANNUAL GENERAL MEETING.

*January 8th*, 1877.

CHARLES VASEY, Esq., President, in the Chair.

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The Minutes of the last Meeting were read and confirmed.

The following gentlemen were nominated for membership :—

Mr. Joseph James Simmons, L.D.S., 18, Burton-crescent, Resident.

Mr. Joseph Harrison, 14, St. James's-street, Sheffield, Non-Resident.

Mr. J. B. Brownlie, L.D.S., Glasgow, Non-Resident.

Mr. J. Moore Lipscombe, L.D.S., Clark-street, Kilmarnock, N.B., Non-Resident.

Mr. Henry B. Mason, L.D.S., 3, Bedford-circus, Exeter, Non-Resident.

The following gentlemen were elected Members of the Society :—

Mr. Alfred Canton, M.R.C.S., L.D.S., Acton, Middlesex, Honorary.

Mr. A. E. Swanson, L.D.S., 112, Cheapside, Resident.

Mr. Pedro Bruce, M.R.C.S., L.S.A., L.D.S., Calle de la Aduano, Valparaiso, Non-Resident.

Mr. Robert H. Woodhouse having signed the obligation book, was admitted by the President a member.

The ballot was then opened for the election of Officers and Councillors for the ensuing year.

The Treasurer, Mr. Parkinson, read his Report, which will be found appended to the present number of the Transactions.

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The Curator (Mr. C. S. Tomes) said he had very little to report in regard to the Museum. During the past year upwards of fifty specimens had been added, the great majority of which had been presented by members of the Society, and only a very few—some three or four—purchased; no other specimens of sufficient interest to warrant an expenditure of the funds of the Society having been brought under his notice. He was sure the members would be glad to hear that the students of the Dental Hospital availed themselves to a much greater extent than formerly of the privilege afforded them of visiting the Museum.

The Librarian (Mr. T. Rogers) said that thirty or forty more books had been borrowed from the Library than in the previous year, and he could certainly affirm that the Library was much more used by the students at the hospital than it had previously been. Some volumes were missing, and might possibly have been borrowed without having been entered in the book. He had the permission of the Council to insert a list of those on the cover of the next issue of the Transactions, and would be exceedingly obliged if any gentleman having such in their possession would return them to the Library.

Mr. Oakley Coles exhibited an arrangement for employing enamel-chisels in connection with Kirby's pneumatic mallet. The chisel-points, which were made by Messrs. Ash, screwed into the receptacle for the plugger, and by using the mallet in the usual way they got a very smart blow, by which they

could break down the enamel with much less discomfort to the patient than with hand-pressure, or the ordinary hand-mallet. It seemed to answer the purpose perfectly, and could be used in any position. There was great variety in the forms of the chisels, so that they could be used on the distal surfaces of the teeth and in awkward parts of the mouth with perfect security and no risk of slipping, or injury to the mouth.

Mr. Turner said, at a recent meeting some models were exhibited by Dr. Orphoot, of Edinburgh, illustrating a matter of considerable interest; viz., how teeth might be regulated without the application of any mechanical contrivance, simply by a judicious removal of any which might be in an irregular position. He had two models, carrying out Dr. Orphoot's views. They differed very considerably in appearance. The first showed the state of the mouth prior to the removal of several teeth, and the second represented the condition after a lapse of about eighteen months. The patient was an extremely delicate and diminutive boy; any mechanical application was quite out of the question, and all he could do was to remove some of the teeth. The result was to his mind highly satisfactory; the patient presented a very fair appearance, and had a useful as well as good-looking set of teeth: he was fourteen and a half years of age when the teeth were removed, and about sixteen when the second impression was taken.

Mr. Thomas Rogers said he had read in the "Transactions" the discussion at the last meeting on swallowing artificial teeth, and the allusion to a case which, when it happened, Sir James Paget spoke to him about. He went to Sir James to ask him if he had kept the notes of the case; he said he had not, but referred him to Dr. Neale, who had been in the habit of making a kind of index to all the medical papers for some years past. Dr. Neale not only referred him to Sir James Paget's case, but also to a great number of similar cases. He had procured copies of the papers containing those cases, but did not propose to read them, as it would take too much time. He suggested whether it were not worth while publishing an

abstract of the cases in the "Transactions," as many of the members might like to refer to them without caring to hear them read *in extenso* at a meeting like that.

The opinion of the Meeting being favourable to the suggestion, the matter was referred to the Council, to be dealt with as they thought fit.

Mr. OAKLEY COLES said that latterly he had been using a preparation called vaseline, prepared, he believed, in some way from petroleum, and had found it very useful for coating the surface of Stent's composition. After the tray was filled in the ordinary manner with Stent's or Hind's composition, it was smeared over with a little of this vaseline, and then warmed over a spirit-lamp. By that means a much sharper impression was obtained than by using it in the ordinary way, and a much better one than could be obtained with wax. The advantage of vaseline over cold cream or oil was its being absolutely without taste and smell, and at the same time not at all apt to become rancid, so that it was always ready for use, and the patient suffered no discomfort from its being applied on the surface of the material for taking the impression. It was made by two or three chemists in London, and imported also from the United States.

The PRESIDENT was sorry to say he had been very unfortunate with Stent's modelling material. He frequently found some one or more of the teeth shorter than others, as if the heat of the material had warmed the enamel of the teeth, and made them adhere to it. He had used his best endeavours to overcome this, but every now and then was sadly disappointed in the result of his models. He had trays with a number of small holes in them, and wherever a tooth stood, he pricked the material so as to allow the air to come in; but still he found the teeth short, as if in taking out the model the composition had adhered to the teeth.

Mr. OAKLEY COLES said he believed the secret of success with these compositions, as with plaster of Paris, was to put

the impression-tray so in as to bring it in contact with the gum, first at the back part of the mouth, and then gradually elevate it from behind forwards, leaving it till it was perfectly hard before attempting to remove it. He had experienced the accident referred to by the President, but found it chiefly to occur where the tray had been removed before the Stent was quite hard.

Mr. Dennant said the great secret of success was to have a tray suitably adapted to the form of the mouth. They were all too apt to use trays provided for them at the depôts, forgetting the importance of the individuality of every mouth that came under their care. He was in the habit of using up vulcanite for the purpose of securing a suitable tray with which to take an impression; for when they got an equable thickness of the impression-material over the tray, they obtained a far greater average of success.

The President said he succeeded as nicely as he could desire with plaster of Paris and good English wax, but with Stent's material he certainly failed.

Mr. Sewill said he might perhaps suggest a subject which was well worthy of consideration, in relation to irregularities. At the last meeting a short discussion took place on the subject, and two diametrically opposite opinions were rather emphatically expressed on a very important point; namely, whether it were the more desirable to reduce teeth rapidly into position by mechanical appliances, or to do it slowly. In his own practice he carried out the latter principle, because he believed the balance of evidence to be in favour of the theory that rapidly reducing a tooth was likely to damage the stability of that tooth. There was very little evidence as to what were the actual changes which took place in the bone during the regulating operations where mechannical appliances were used, and where a tooth was made to move a considerable distance; in fact they had no evidence from *post-mortem* examination to show the exact change which took place in the bone; but, judging from

analogous circumstances and other facts, the evidence was, in his opinion, very strongly against rapidly moving teeth; the principle, as it appeared to him, upon which teeth ought to be made to move, was to effect a slow absorption of bone, in the expectation that a deposit of bone would take place at parts where space was thus left. The absorption should take place with as small an amount of irritation as possible, for if there was anything at all of the nature of an acute inflammation, the probability would be that it would be destructive, and not followed by repair. He certainly had not seen a case in which a tooth had been damaged as to stability by being slowly moved, but he could recall many cases in which their stability had been seriously compromised by being rapidly moved. These observations would not perhaps apply so much to extremely young patients as to older ones. In very young children, the alveoli not being fully formed, they often had to deal with soft parts,—the tooth moved in an open orifice merely surrounded by soft tissues; but if the bone was fully formed, the remark made against the rapid removal of teeth had still greater force.

Mr. Turner said the subject was one of great interest to them all, and might be discussed with advantage. For his own part, in regulating cases he was only too glad to see the teeth move as soon as possible. Sometimes they could not get them to move at all, and he should be very sorry to keep back a tooth if he saw it inclined to move very quickly into the position he wanted it. They must be careful not to apply too much force, but if they were conscious that they were applying simply a moderate amount, such as an elastic band would give, and saw a tooth move into position, it would be great folly to retard the progress of the tooth, or to make the force smaller because it was moving too quickly. The real question was, how much force they ought to apply, rather than how quickly they ought to move the tooth. He had to regulate the six front teeth a short time ago—a most unpromising-looking case; but in five weeks he had the teeth into their position, and ready for the retaining-plate. It was very quick, but he

saw no untoward symptoms arise; the teeth had not become unduly loose, and there was no undue inflammation of the gums—anything approaching acute inflammation they would, of course, avoid altogether. In that instance he applied moderate force, and got very quick and excellent results, and it would have been folly on his part to have refused to accept those results when they came so readily to his hand.

The ballot was then closed, and the scrutineers appointed—viz. Mr. Cattlin, sen., and Mr. Rymer—proceeded to examine the balloting-papers, and reported that the gentlemen recommended by the Council as Officers and Councillors for the ensuing year had been duly elected, viz. :—

*President.*—Samuel Cartwright, Esq.

*Vice-Presidents.*—Resident: Edwin Saunders, Esq.; Charles Rogers, Esq.; A. J. Woodhouse, Esq. Non-resident: G. W. Buchanan, Esq. (Glasgow); Daniel Corbett, Esq. (Dublin); H. Campion, Esq. (Manchester).

*Treasurer.*—James Parkinson, Esq.

*Librarian.*—Thomas A. Rogers, Esq.

*Curator.*—C. S. Tomes, Esq.

*Honorary Secretaries.*—J. Smith Turner, Esq. (Council); J. Oakley Coles, Esq. (Society); W. G. Ranger, Esq. (for Foreign Correspondence).

*Councillors.*—Resident: Henry I. Barrett, Esq.; Alfred Coleman, Esq.; Charles West, Esq.; E. B. Randell, Esq.; F. G. Bridgman, Esq.; F. Weiss, Esq.; H. B. Longhurst, Esq.; W. J. Parks, Esq.; H. Sewill, Esq. Non-resident: J. E. Rose, Esq. (Liverpool); C. H. Bromley, Esq. (Southampton); S. Amos Kirby, Esq. (Bedford); J. Dennant, Esq. (Brighton); C. G. De Lessert, Esq. (Wolverhampton); W. Margetson (Dewsbury).

The PRESIDENT then delivered the following Address :—

## CHAIRMAN'S ADDRESS.

Gentlemen,—The valedictory addresses give from this chair have been, I believe, without a exception, of a character, gratifying to the mem bers of our Society to hear, telling only of pro gress, prosperity, and success, both in-doors an out of doors.

At our last Annual Meeting our President wa unable to attend, and we were presided over b our then senior Vice-President.

His address on that occasion was in the sam laudatory strain, and I felt a thrill of pleasur run through me as I thought of the distinguishe honour that had been conferred upon me by m election to fill the presidential chair of a pro fessional society, founded for a noble purpos and unselfish end, carried on, and carried ou with the most praiseworthy spirit, and with th best possible results. Yet but nineteen days fron that date, and there was announced in the medica papers, in a kind of "blaze of triumph," that a new Dental Society had been established. And as further particulars became public, it was found that he who had presided over us just nineteer days before, without one word of admonition t

us, as to our failing in either duty or in spirit of true progress, had taken high office in the new association. Certainly this new association was said to be in no way antagonistic to any other older institution. Yet, though a dental organization, its laws excluded from ordinary fellowship the great majority of the members of our Society, two hundred and thirteen out of two hundred and sixty-one. About forty-eight of us only being considered eligible for ordinary membership on its exclusive benches. As time rolled on, however, other cards were manifested, and on June the 3rd, the editor of the *Lancet*, who had warmly espoused the new movement from its commencement, published the following statement:— "Ample justification for the formation of the new Society is found in the laxity of the rules regulating the admission into the Odontological Society, which cannot by its constitution be held faithfully to represent what is most advanced or most creditable in the specialty." Four of the office-bearers you elected to assist me in the management of your affairs for the year, joined the new movement, and some twenty-five or so of our ordinary members, yet not one of them has written a word in repudiation of this published aspersion on the constitution of our Society. They seem to have failed to see that it is a reflection on the good and great names of those who have passed

from among us, those who laboured so faithfully, so zealously, and so successfully for the profession they loved, and whose aims were as lofty and as creditable to them as any that could inspire them as professional men. I believe their great work, as exemplified in the constitution and foundation of this Society, will challenge the admiration of future generations of those who are to succeed us in the practice of dental surgery. On June the 10th one of this new association's members, apparently fearing that silence might not be understood as assent, wrote to the same journal in support of the editorial remarks, and said, "Let those gentlemen who declaim against your remarks scrutinize the list of members of the Odontological Society, and ask themselves if it be necessary to sweep the Augean stable or not." This also has been endorsed by the silence of every member of the new association, for during the seven months since its publication no single word of repudiation has appeared from the pen of one of them.

It has been said of the Odontological Society, by those well able to judge and to give an opinion, and what was said is as applicable at the present day as it was at the time when said: "That it has been and still is the representative of the dental profession. Through its influence the scattered units of the profession were brought

together and united into a brotherhood; by it the Legislature and College of Surgeons were moved to give us the dental diploma, and the Dental Hospital and School sprang up at its bidding. The elevating influences of the Society has spread far beyond its own circle, and every one is ready to admit that a very much higher tone of truly professional conduct has pervaded the whole profession since its establishment."

With such a character to sustain us we need not fear the ill-advised proceedings of any small section of the profession.

One of the objects of our Society is to promote intercourse among members of the dental profession, and the council in keeping with this its cosmopolitan character, fearlessly nominated Mr. Cartwright as our next President. He assured us he was as interested in the progress and prosperity of the Odontological Society now as he had ever been, and I can testify to his interest having been at one time paramount.

On the very favourable report from our Treasurer, I have to congratulate you. The financial and general prosperity of our Society is most cheering, and the addition of twenty new members most satisfactory. During the year we have not lost one member through death. We had a loss from this cause of one who in the ordinary course would have become a member. In him many

have lost a true and sincere friend, I refer to the late Mr. J. E. Watson, of Paris. He was a thoroughly accomplished dentist, of kind and genial disposition, and his loss is an irreparable one to a large circle of attached friends and patients. Though a most intimate friend of many who took deep interest in this Society, and in no way indifferent to the progress of his profession, still he was not easily induced to join our ranks. In this respect he was a representative man of a considerable portion of the profession, who, in the first instance, were deterred from joining in our work by the want of unanimity in the schemes propounded, and the apparent indecision that prevailed as to the principle of organization best adapted to carry out the generally-desired reforms. Strange to say the very year he was induced to join our work, by the apparent unanimity of purpose that seemed to exist among us, was the very one that for the second time was to see divisions opened up in our ranks. Among the two thousand men who make up the dental world in the British Islands, there are many, like our friend who has passed away, who will not be coerced into any special groove by any fractional part of the general body.

Resident members have frequently suggested that our annual subscriptions should be reduced to one guinea all round, and on the other hand,

many of our non-resident members imagine that as they seldom have the opportunity of attending the meetings they must be extra-profitable subscribers to the Society. The truth is, as any one can work out for himself from the Treasurer's reports, the "Transactions" being a limited edition of about 300 copies, proves to be a very expensive publication. The transactions, rent of our room, and reporters' fees, cost us about a guinea each. Were it not, therefore, for the double subscription paid by the resident members, and the entrance fees, we could neither afford museum, library, nor refreshment expenses, and we certainly never could have accumulated anything of a surplus fund.

On looking through our published papers and discussions, one is led up to the idea that any tooth, the subject of caries to whatever extent, may be preserved to the patient; that there is no limit to the loss of substance that may be restored by one kind of stopping or another; that a decayed tooth may be extracted, cleaned, stopped, and replaced, and still be a useful member; that alveolar abscesses may be dispersed by the injection of carbolic acid and other antiseptics.

In our papers and discussions I think we should be careful to distinguish between rare and interesting cases and those that make up the bulk of our general practice. No part of the

human organism can be improved by the surgeon's skill, defects only can be modified or amended. The simplest wound when united leaves the part less perfect than it was previous to the injury. Extreme conservative surgery should be the aim and object of all our work, at the same time exaggerated views not borne out by facts or just experiment lessen our influence and progress. The work carried on in another part of this building should make us thoughtful and temperate. On adding up the results of the work done in the Dental Hospital of London, as given in the reports published in the *British Journal of Dental Science* for ten months of last year, the aggregate number of extractions of diseased teeth amounts to the enormous total of 11,845, whereas the number of stoppings done were only 4,480. The hospital being our principal educational institution, and that in which our future practitioners are being educated, these statistics show a formidable balance on the wrong side of conservative dental surgery. The public are also becoming deranged by a nerve-destroying mania, under the belief that teeth so treated are to be for ever afterwards perfect.

As a profession, we are very much behind in public work. During the past year active measures have been taken to establish a dental hospital in Dublin, but it has not been warmly

supported by the leading members of that city. In a capital like Dublin there should be a well-supported dental hospital and school, and a dental degree should be granted by the Royal College of Surgeons of Ireland. It is of national importance to Ireland that these should be established, and successfully carried on; the responsibility of their not being so rests with the leading dentists of Dublin. There are forty-seven dentists in practice in Glasgow, the capital of the west of Scotland, a population of about half a million, a large medical school, and an unrivalled university, but without any adequate system for the study or practice of our profession. Edinburgh is also a great seat of learning, with forty-four established dentists, extensive surgical college, and university, yet without dental curriculum, examination, or degree.

Of extensive statistical records we have none that we can refer to to establish a new view or prove a new theory. Every town of twenty thousand inhabitants should have at least a dental dispensary, the accumulated statistics of which in a few years would be invaluable. How many of our profession could tell whether diseased or defective teeth are more actively painful during the summer or winter months? whether in places where they use rye bread the teeth are better than where they use wheaten? whether in wine-

drinking communities the teeth are more perfectly developed than in those using other products? I hope the coming rivalry between the new Association and this Society will expend itself in efforts to accomplish real professional work, and assist to supply the needs of our profession as a scientific body.

Mr. Rymer said he was sure they had all listened with very great pleasure and profit to the eloquent Address delivered by their worthy President, and would be pleased to join in offering him a cordial and heartfelt vote of thanks for that Address, and also for the manner in which he had presided over the councils of the Society during the past year. (Applause.) The sentiments he had just uttered represented, he believed, entirely the feelings of the Society, and the general professional points would no doubt be read with profit—as they had listened to them with interest—by those of their fellow-members who were unable to attend that evening. He had had the great pleasure of knowing Mr. Vasey for a period extending over twenty years, and could say that a more genial, thoroughly kind-hearted spirit did not exist in that or any other profession. (Hear, hear.) Mr. Vasey was also a gentleman possessed of a very large amount of ability, which had been displayed in his presidency during the past year, and it was also worthy of notice that he had never once been absent from his position in the chair. The year of office must have been one of no small anxiety, because they could not fail to have perceived a considerable amount of commotion among their ranks—differences of opinion and so forth, and therefore the post of President of the Odontological Society, which, as Mr. Vasey had rightly stated, was thoroughly representative of the Profession, had been one of no small delicacy. It had, however, been maintained with great honour and credit. With regard to the position of the Society, he had heard it stated that it was not in the satisfactory state in which it ought to be, but in his opinion, all things considered, the Odontological Society of Great Britain was never in a better position than at present. (Applause.) He did not fear differences of opinion, but he should very much fear if he found that the Council of that important Society was influenced by merely temporary ebullitions of feeling on the part of a few individuals, or that the wind of ever-changing opinion should

in any way influence them. They had known their duty, and had acted up to it; the objects of the Society had been kept steadily in view and honourably maintained. The position occupied by their President was an honourable one—the greatest honour that the Profession could confer upon any one of its members. Mr. Vasey left his position as President that night, but the honour would follow him. It was characteristic of the office of president of a society like that, that although the post might be vacated the honour remained. (Hear, hear.) Long might he continue to enjoy that honour, and to receive the respect and the affection of his fellow-practitioners. (Applause.)

Mr. Thomas Rogers said he had very great pleasure in seconding Mr. Rymer's proposition. Having had the honour to be a member of the Council, he could speak as to Mr. Vasey's able conduct at the Council meetings. It was true that it had been a somewhat unsettled year. It was said that, with commotion in the atmosphere, there were also political commotions; let them hope that the atmospheric commotions would soon pass away, and with them all the other commotions at present so unfortunately existing, and that they would have again a united and well-organized Society. Mr. Vasey had done his very utmost during the year to prevent any kind of excess of feeling on one side or the other. He hoped Mr. Vasey would not mind his making one or two remarks with regard to his statement about the Dental Hospital. It was true there was a very large proportion of extractions, but they must remember that patients did not come to the Hospital as they did to them in private practice; they came with their teeth in such a state that they could no longer keep away, and therefore the proportion of extractions must be very much larger than in private practice. Again, when he stated that with all the care and economy possible, the finances of the Hospital were not very prosperous, they could easily understand it was not practicable to carry out stopping to the very great extent that they could in private practice. He hoped Mr. Vasey would not be offended at his venturing to say

few words in defence of that Hospital, of which he had had the honour to be one of the officers.

The resolution was then put and carried by acclamation.

The PRESIDENT said he sincerely thanked the members for the honour they had done him in placing him in that chair, and also for the handsome vote they had just accorded him. He had the interests of the Profession at heart, and nothing would give him greater pleasure than to see them a united body, all acting together, and adding to their status and their usefulness among their fellow-men. (Applause.)

Cordial votes of thanks were then accorded to the Treasurer and Secretaries, and the Society adjourned to February the 5th.

## *The Treasurer in Account with* The Odontological Society of Great Britain.

### *Financial Statement,* 1875–1876.

| Dr. | £. | s. | d. |
|---|---|---|---|
| To Balance at Bank, October 31, 1875 | 195 | 7 | 2 |
| Deposit Note | 200 | 0 | 0 |
| Annual Subscriptions | 330 | 15 | 0 |
| Entrance Fees | 68 | 7 | 0 |
| Arrears | 22 | 5 | 0 |
| Interest on Stock | 27 | 14 | 9 |
| Interest on Deposit Account | 1 | 7 | 3 |
| Petty Cash on Account | 20 | 0 | 0 |
| Cash in Treasurer's Hands, October 31, 1875 | 49 | 13 | 11 |
| Sale of "Transactions" | 1 | 5 | 0 |
| | £916 | 15 | 1 |

| Cr. | £. | s. | d. |
|---|---|---|---|
| By Rent (one year) | 50 | 0 | 0 |
| Purchase of Stock, with Deposit Note and Interest | 201 | 7 | 3 |
| Stock Purchased, October 6, 1875 | 12 | 2 | 7 |
| Stock Purchased, October 6, 1876 | 12 | 2 | 7 |
| Cost of Transfer of Stock | 1 | 1 | 9 |
| Power of Attorney | 0 | 5 | 0 |
| Stock Purchased, October 6, 1876 | 15 | 12 | 2 |
| Printing Balance, 1874–75 | 39 | 1 | 6 |
| Printing and Publishing "Transactions," Postage, &c. | 178 | 16 | 0 |
| Reporting | 28 | 7 | 0 |
| Refreshments | 26 | 3 | 4 |
| Secretary's Salary (one Year) | 25 | 0 | 0 |
| Postage and Receipt Stamps | 8 | 12 | 0 |
| Library and Museum | 14 | 1 | 4 |
| Sundry Expenses | 5 | 2 | 6 |
| In Treasurer's Hands | 32 | 16 | 5 |
| Balance at Bank | 266 | 3 | 8 |
| | £916 | 15 | 1 |

| | | | |
|---|---|---|---|
| Total Receipts for the Session 1875–76 | £464 | 6 | 7 |
| Total Disbursements ditto | 390 | 1 | 0 |
| Balance per Receipts | 74 | 5 | 7 |

### ASSETS OF THE SOCIETY, OCTOBER 31st, 1876.

| | | | |
|---|---|---|---|
| Stock in New 3 per Cents | £1,070 | 2 | 4 |
| Cash at Bankers | 266 | 3 | 8 |
| In Treasurer's Hands | 32 | 18 | 5 |
| | £1,369 | 4 | 5 |

## Statement of Deaths and Resignations of Members, and New Members elected during the Session 1875–76.

### October 31st, 1876.

| | |
|---|---|
| Number of Subscribing Members—Resident | 101 |
| „ „ „ „ Non-resident | 167 |
| „ Honorary „ | 27 |
| „ Corresponding „ | 22 |
| Total | 317 |
| Deaths | 1 |
| Retired—Resident | 7 |
| „ Non-resident | 4 |
| Removed by Council | 3 |
| Total | 15 |
| New Members elected—Resident | 13 |
| „ „ Non-resident | 16 |
| Total | 29 |

### October 31st, 1875.

| | |
|---|---|
| Number of Subscribing Members—Resident | 93 |
| „ „ „ „ Non-resident | 157 |
| „ Honorary „ | 27 |
| „ Corresponding „ | 22 |
| Total | 299 |
| October 31, 1876 | 317 |
| October 31, 1875 | 299 |
| Increase | 18 |

*Notes upon the Condition of an Elephant's Molar which had been injured by a Rifle-ball.* By Charles S. Tomes, M.A., *Curator of the Museum.*

Though it is common for the tusks of elephants which have been struck by bullets to come into the hands of ivory-turners, it is very unusual for the molar teeth to have been subjected to similar injury, and I am not acquainted with any other example of this accident having been described. My friend Mr. Moseley, of the *Challenger* scientific staff, drew my attention to the existence of this specimen in the possession of Major Rossall, and my friend Mr. Bird has been kind enough to procure for me the following particulars as to the animal whence it was taken :—

"The accompanying teeth were taken from the head of an elephant which had frequented the coffee district of South Wynaad, Ceylon. It had been well known for ten years "as an old rogue," on account of its peculiar tusks, as well as its great size. It was shot by Major Rossall, close by a coffee plantation in South Wynaad, brought down by one shot in the ear from a No. 7 Rigby rifle. The

elephant fell on his side. On the left or upper side of his head and forehead were found six old bullet-wounds, one through the base of the tusk. The others were not traced, and, as the animal could not be turned over, owing to his immense weight, the other side was not examined. On the forehead, about six inches below the surface, was found a collection of matter, about a quart. Some planters had been charged by him some months previously, on which occasion he was fired at and hit in the forehead. The natives were left to cut out the teeth and the tusks, the stench from the animal preventing any minute examination. The orders were, that one tooth only should be taken out, but the Coolies extracted all, when the accompanying tooth was found to contain a bullet. The foot, tail, tusks, and skin presented all the appearances of having belonged to a very old elephant. The fore foot measured five feet in circumference, his weight was estimated at five tons, and he measured ten feet in height at the shoulders; he was not girthed."

Major Rossall, the possessor of the tooth, has been so kind as to allow me to have it sawn through its middle, and has lent it to me for the purpose of its being figured.

Elephant tusks which have been injured are exceedingly interesting to the dental pathologist, because in them we often have pathological pro-

cesses set up upon a large scale, which do indeed occur in human teeth, but upon such a scale as to be discoverable only by microscopical examination. And such pathological processes are seldom allowed to run their course in a human tooth, because the possessor of the tooth is speedily driven to seek relief by its extraction.

As an example of what happens when a pulp is violently injured, but not destroyed, and then is left to itself to work out to the full whatever pathological processes may be set up, this elephant's tooth is, I believe, unique. The tooth is believed to have been the left lower molar, but owing to the condition of the carcass this was not positively ascertained. The bullet has apparently struck the side of the tooth, somewhat below and considerably behind its middle, and, until the tooth was cut through, remained loosely enclosed within an irregular cavity capable of holding about two fluid ounces. To what extent it broke up and shattered the dental tissues cannot now be seen, for the cavity in which the bullet lies has obviously been excavated by subsequent inflammatory processes, and its walls are all formed by uninjured tissues, which, from the regularity with which the plates of dentine and enamel are disposed, were obviously formed prior to the infliction of the injury (*see l*, Plate 2). The arrangement of the enamel, dentine, and cementum is perfectly

normal in the whole of that part of the tooth which lies in front of the bullet-hole ($k$, $h$, $h_1$, Plate 2), and also in that part which lies immediately behind it ($l$ and $h_2$, Plate 2). At a distance of about an inch and a half behind this hole the plates of dentine and enamel become stunted and irregular in form ($i_2$, $i_3$, $i_4$), and in the remains of the last plate osteodentine has taken the place of true dentine. To what extent the further development of the tooth had been cut short we have not the means of knowing, as we can neither tell of how many plates this individual tooth originally consisted, before its anterior portion was worn away, nor can we judge which of the six molars which succeed one another from behind forwards this was, save that the large size of the elephant would lead to the inference that it was the fifth or sixth; in which case it would have originally consisted of about sixteen or twenty-four plates.

But the interest of the specimen lies not so much in the modifications brought about in the development of its posterior portions, which are surprisingly slight, as in the extraordinary extent to which dentine, enamel, and cementum previously formed have been excavated and removed by the morbid processes set up in the pulp.

That an abscess at the surface of the pulp is capable of causing absorption of hard dentine is abundantly exemplified in specimens of ele-

phants' tusks, of which we have some in our own museum,* but I have never seen nor read of any example of destruction of hard tissues to anything like the same extent to which they have suffered in this tooth.

It is difficult, and indeed impossible, to decide at what precise point the bullet had struck; but judging from the few data remaining, it would appear to have been above the level of the common pulp-chamber, a little below the point indicated at *d*, in Plate 1. But the exact original point of entry is obscured by subsequent processes of absorption, and redeposition of calcified material, by which all the edges of the hole have been rounded down and smoothed.

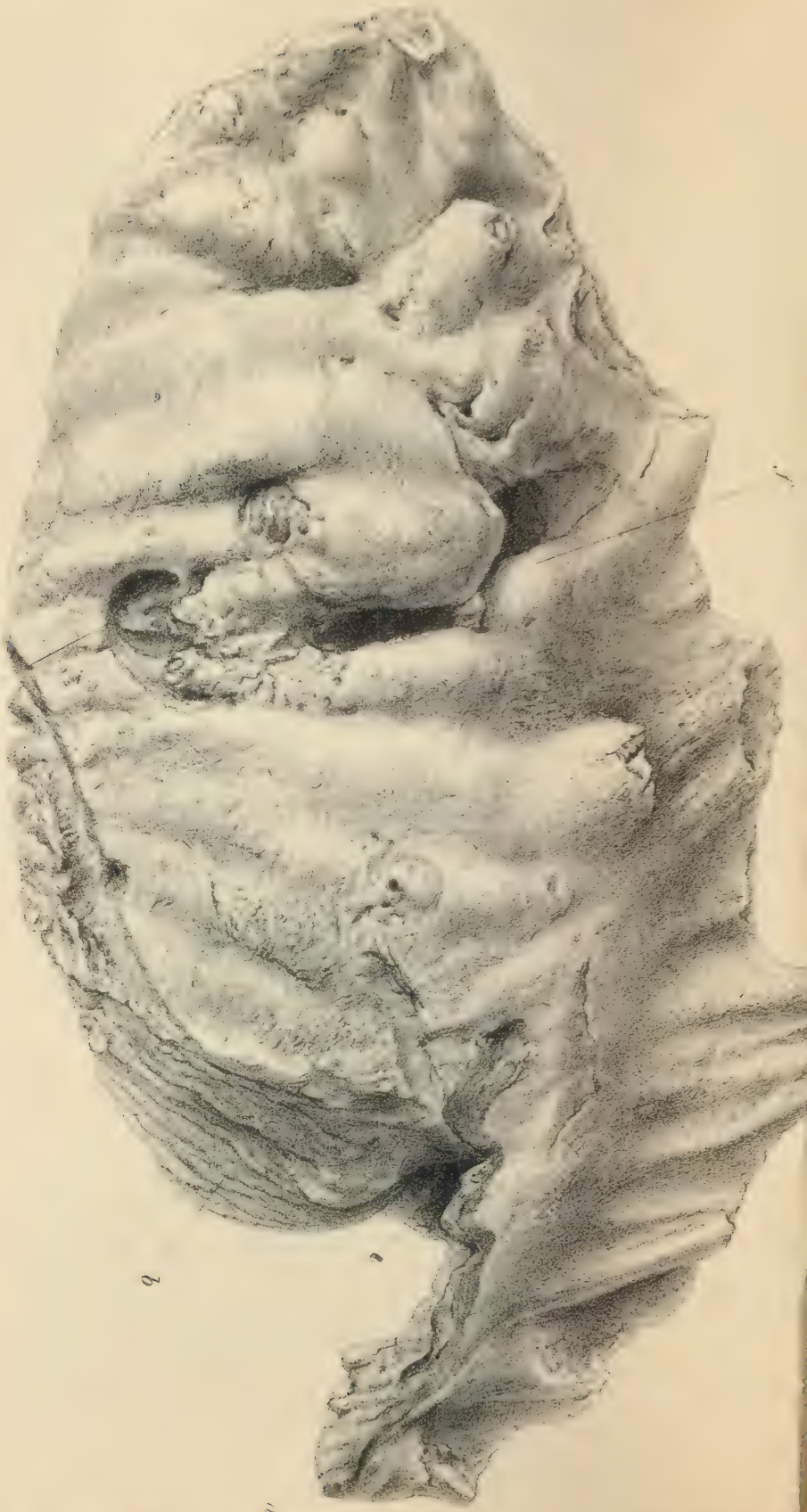
Intense inflammation of the pulp seems to have ensued, and the existing walls of the pulp-cavity have been attacked by absorptive action, even at a distance from the point of injury. Thus at *h* and $h_1$, Plate 2, the dentine, which must once have been solid in these plates, just as it yet remains in the younger plates behind them, has been removed, so that hardly a vestige of dentine remains in them, though the enamel is intact. In front of this, towards *a*, the absorption has gone on to such an extent as to weaken the tooth, until all that lies above the pulp-chamber

* Also in the teeth of a grampus, described and figured by me, "Trans. Odont. Soc.," 1873.

has crushed down under the force of mastication; hence at *e*, in Plates 1 and 2, there is a large hole leading straight into the pulp-cavity, and the plates of dentine and enamel above it are gone. This clearly shows that the elephant was making use of the tooth as a grinder even after all these inflammatory processes were in full action.

As has been before mentioned, the tooth is chiefly remarkable as an example of the extraordinary extent to which an inflamed pulp has burrowed about, and eaten its way through the pre-existent hard tissues of the tooth; and what is rather remarkable is, that this absorbent action has gone on with the most activity at some distance in front of the injury. Thus the greatest amount of absorption seems to have happened in front of *e*; the dentine has been most completely removed from the plate *h*, less so from $h_1$, and still less from *k*. The absorption in this front part of the tooth is curiously regular, and is limited to the removal of dentine from inside the enamel, as is the case also in the plate $h_2$ behind the injury.

But behind this point absorption has drilled out holes of irregular form, and has eaten away any tissue which happened to come in its way indiscriminately. The figures, however, tell their own tale so well, that a more lengthy description seems needless.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## DESCRIPTION OF PLATES.

PLATE 1.—Side view of an elephant's molar, which has been struck by a bullet.

($a$) Front of tooth, broken down to level of floor of pulp-cavity.
($b$) Front surface of the anterior plate, which remains standing.
($d$) Irregular hole with rounded edges, leading into cavity where bullet lies.
($e$) Ditto ditto, from below.
($c$) Posterior activity of tooth.

PLATE 2.—Horizontal section of same tooth: lower portion viewed from above.

($a$) Front of tooth.
($c$) Back of tooth.
($g$) Bullet lying in cavity.
($h$) Transverse plate from which the dentine has been removed by absorption.
($h_1$, $h_2$, $h_4$) Ditto.
($k$) Plate but little affected.
($l$) Plate of normal formation (*i.e.* formed prior to injury), but almost all absorbed.
($l_2$) Plate almost normal.
($i_2$, $i_3$, $i_4$) Distorted plates, formed subsequently to injury.

# GENERAL MONTHLY MEETING.

*February 5th*, 1877.

SAMUEL CARTWRIGHT, Esq., President, in the Chair.

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The Minutes of the previous Meeting were read and confirmed.

The following gentlemen were nominated for membership :—

Mr. Milword Harding, L.D.S., 19, Park-square East, Resident.

Mr. George R. Keeling, Jun., L.D.S., Epsom, Non-Resident.

The following gentlemen were elected Members of the Society :—

Mr. J. B. Brownlie, L.D.S., Glasgow, Non-Resident.

Mr. J. Moore Lipscombe, L.D.S., Clark-street, Kilmarnock, N.B., Non-Resident.

Mr. Henry B. Mason, L.D.S., 3, Bedford-circus, Exeter, Non-Resident.

Mr. A. J. Swanson having signed the Obligation-Book was admitted a member of the Society.

The President.—Gentlemen, I rise to thank the Council for the honour it has done me in nominating me for election, and also those friends and members who were kind enough to

support my election. I say those members, because I know that there are a few who had other objects in view. As far as my own feelings go, my personal comfort and convenience would have tempted me to have avoided occupying this position for the second time; but at the same time I considered it a duty I owed to myself to assert my right, and also I feel very strongly that my past services in this Society entitled me to some recognition. I cannot but remember the very long service that I have given, and I feel that every one here ought to suppose that I have still a warm interest in its welfare. I have seen to-day, for the first time, two pamphlets, one a résumé of an article that appeared in one of the journals, and the other the address which emanated from the late President. I should not have made any remarks upon either of them, had not the views expressed in the late President's address touched me nearly. I do not think he quite understands the object that those gentlemen had in view who formed a new association, and I think that that association has become a sort of association on the brain with him, and not quite understanding the motive of those who inaugurated it, he, in rather an excited manner, has made remarks which are to my mind unnecessary. I will not touch further on this subject: diversity of opinion will always exist, and I do not suppose, as long as this world lasts in its present condition, we shall ever have a political or any other subject without divergence of opinion. I remember some years ago, when the Odontological Society gave its first dinner, and invited certain members of the then existing College of Dentists, the late Mr. Jacob Bell, who was one of the visitors at that dinner, in the course of some remarks said it was very rarely that he found diametrically opposite views approached so as to come into union, but he thought from what he saw and heard that night there was very little doubt that that desirable end was near at hand. Following very shortly, that desirable end came, and during the period of my last presidency, when I had the honour in 1863 to occcupy the chair, I had the pleasure also to witness the union of those two formerly antagonistic bodies, and we then became one society,—a consummation that was agreeable to all our feelings.

Consequently the period arrived in which we became associated with the College of Surgeons, and numbers of members of the profession went up, for example's sake, to obtain the licentiateship in dental surgery. That licentiateship I unhesitatingly say has done much good, but I am sorry to be obliged to say—and I think before any body of gentlemen one may speak candidly—that advantage has not been taken of the period of grace which was afforded at that time, nor has it been properly understood or adopted by many of those pupils who, having been educated at the Dental Hospital and the school under a promise to pass for the licentiateship, have still disregarded their promises and have not done so. This is much to be regretted, and it is a subject that touches this Society nearly, inasmuch as it continues to admit unqualified practitioners. At the time when the Society was formed we were perfectly right to endeavour to begin by associating with us all who were honourably practising our branch of the profession. The College of Surgeons, it must be remembered, granted a diploma in dental surgery; thus approximating us to the medical profession. If gentlemen have not taken advantage of the opportunity that has been more than once afforded them, it is their own fault, and not our fault; and if the students will not take advantage, in spite of their promises, and go up for that diploma, it is not our fault. Therefore, if they at any time be incapacitated from becoming members of this Society, they have only themselves to blame. Upon that point I feel very strongly, and it is a question for the Society seriously to consider whether they are acting fairly to those who have worked for and obtained that diploma, in placing them on an equal footing with those who have not taken it. I support this view most strenuously, and I believe any one who looks carefully into the question must feel as I do. I will not say more, but merely express my opinion that the Society would not only raise itself in general estimation, but would give a stimulus to those students who do not go in for the examinations at the College of Surgeons, and would act fairly to those who have taken advantage of the diploma. I think that this is the anniversary, or rather the coming of age, of this Society, for it is the 21st year of its

existence, and that is going back a long way; but I hope there is an equally long future before it. If we look at differences which exist still, we shall find that in the end those differences, when the pen has done its work and the tongue has had its say, will in all probability end in what is rational; and although there are opposite opinions, I cannot understand why they cannot be mooted with temper, sense, and good taste. There can be no good object gained in writing hard at one another; and generally those who throw pebbles get stones in return. With regard to the arrangements of the evenings here I think we shall all acknowledge that no society can go on without proper nourishment. The food is the papers and communications which we have submitted to us, and it is very important to have carefully-prepared material. If gentlemen are called upon to write papers on short notice, it is impossible that they can be written either to their own satisfaction or to ours. We are thankful to them for doing so, because the want of the moment is in a measure supplied; but if we had two or three papers in a session carefully prepared, and containing original matter, or at all events of sufficient interest to satisfy the members generally, it would be very much better than insisting upon lengthy papers every evening, when we cannot have a paper promised, although probably during this session we may not be deficient. There are points which may be of great interest to the Society, and special cases that occur every day in practice, are always open to discussion, and always productive of information. For instance, there was a subject of interest brought forward at a former meeting, although not new in idea, connected with the curing of alveolar abscess by injection of creosote or carbolic acid. With reference to such a subject, I think we should not only have a record of cases carefully prepared, and explaining, the means by which those agents were forced into the roots of the teeth so as to emerge and exhibit themselves through the fistulous opening of the alveolar abscess, but the results after lapses of time. I think, without having satisfactory data taken from notes, we are apt to go wide of the mark. I often found, during the time I was preparing lectures, that I wrote what I thought to be true, and when I went back to my notes I

found it to be in some degree false. Such a plan of proceeding I am quite satisfied will be of great utility to this Society, and will make communications more valuable. It is not that I for a moment doubt what was stated in that particular communication, but still it is more satisfactory, as a rule, to have facts and results from notes taken at the time. Now, gentlemen, I think I have taken up your time sufficiently long; I have only to thank you for the honour you have done me, and I trust, at the end of my period of Presidency, you will not regret having placed me in this position.

Mr. Oakley Coles exhibited for Mr. Woodman an abnormally large canine tooth, the fang of which was almost entirely coated with tartar; also a tooth received from Mr. Brown, of Tavistock, and described as a supplementary tooth, standing in the front part of the mouth, but having much the appearance of being a case of dilaceration.

Mr. Ashley Barrett exhibited a three-sided drill, to be employed with the burr-engine. The flat two-sided drills were, he stated, apt to stick, at the risk of breaking either the tooth or the spring of the engine, but such was not the case with the three-sided, which were constructed from steel-wire of a conical form. They also could be more readily sharpened than the two-sided form. He had also the pleasure of showing them a very simple form of mallet, originally devised by Mr. Morison, the inventor of the burr-engine. It consisted of a block of lead, having in it a hole, into which the fore-finger could be thrust, so as to sustain it, and employ it for malleting an instrument held between the other fingers of the same hand.

Mr. Moore called the attention of the Society to camphoric ether as an anæsthetic. It possessed the same qualities as ordinary ether, but was free from the unpleasant pungency which rendered the latter so disagreeable when inhaled.

Mr. Turner exhibited some donations sent to the Society by Mr. O'. Meara, of Simla. One was the skull of a bear from Thibet, another an object of considerable interest; namely, the

head of a species of monkey—the interest centring in the late development of the canine teeth, which were not fully erupted till the animal had arrived at the age of sexual puberty, and that was at rather an advanced period of its life. In the specimen before him, the wisdom teeth were completely erupted, while the canines were not yet fully so. Mr. O'Meara had also sent them the head of a cheetah with the skin preserved. He had also received a communication from Mr. Cunningham, a former pupil at the Dental Hospital, now residing in America, relative to a case of absorption of the fangs of teeth. "J. D., aged 25, consulted Dr. F. Whitten for the regulation of a deformed superior arch; viz., the four incisors projected nearly straight, so that the lips could not be closed, and was the result apparently of thumb-sucking. On examination, the teeth appeared quite loose, and on pressure, there was a slight exudation of pus from the free border of the gums. The gums were otherwise in a fairly healthy condition. Extraction was recommended, and on removal, the roots were found to be completely absorbed, as seen in the specimens. There was a very slight deposit of green nodular tartar under the free margin of the gum. On probing after extraction, the alveoli seemed to present very slight, if any, septa—the pulps were alive. The gum healed quickly without treatment."

*Investigations on the Development of Dentine.* By J. Arkövy, Doctor of Medicine and Surgery, Master of Dentistry, Buda-Pesth.

Mr. President and Gentlemen,

We find in the theoretical part of dentistry few subjects of so much interest, and which have given rise to so many explanations and controversies as the microscopical investigations of the development of dentine. A large number of authors have participated in these inquiries; and in the dental, or rather histological, literature of the last fifteen or twenty years this subject seemed nearly exhausted. Yet every one well acquainted with histology feels the insufficiency of the evidence brought to light for the explanation of several points concerning especially the soft dental tissue—the odontoblast-cells—by which the dentine is built up. And it is to this subject I now wish to draw your attention.

Before proceeding to a description of my own observations, it will perhaps be desirable for me to briefly recite the views on this subject that have been already published.

Since the famous discovery and description of "soft tissue in the dentinal tubes," for which the

profession is indebted to John Tomes, new light has been brought upon the histological details of dentine, so that they can now be duly divided into four parts, and one of these parts belongs to the embryonic period. I shall refer to them in a series as they belong to (A) odontoblasts, (B) dentinal fibrils, (C) dentinal tubes, (D) intertubular substance.

With reference to the odontoblasts, Waldeyer maintains that they are mere protoplasmic cells which, by treatment with chromic acid, show a granular outline, but never a genuine membrane. From their central point, he says, they send to the papilla communicating processes. Hertz, on the contrary, distinguishes peripheral dentinal cells, which, he assumes, are provided with sharp borders, formed by the condensation and chemical transformation of the outer layer of protoplasm, producing in this way an "apparently thicker outline." This is what he believes to supply a basis for the "adoption" of a membrane. Neumann, after some hesitation, agreed with this opinion. Boll adopts the assertion of Waldeyer, with his additional discovery of nerve-fibrils partly providing the tubuli. The drawing he brings forth to prove this exposition exhibits, indeed, very nice projections between the odontoblasts. I shall return to his work in the course of this paper. Lent, in his figures exhibits odontoblasts with

double nuclei. Leydig, examining the teeth in lower vertebrates, and regarding them as of cuticular formation, contemplates the odontoblasts as epithelial cells, without having anything in common with the epithelium of the mucous membrane, and made up only by transformation of the connective tissue of the papilla. Kollmann, assenting to this opinion, and also those of Waldeyer and Boll, considers the odontoblasts to be divested of any membrane, and, in accordance with Neumann, to be provided with a single nucleus. Wenzel maintains that quite recent odontoblasts have no membranous covering nor sharply circumscribed outline, which appear only after chemical treatment. As to their origin he advocates the standpoint of Leydig. Hertz goes farther: he draws odontoblasts with one nucleus, and remarks that not in every sample can a nucleus be found at all. This observation is in direct contradiction to his own words, where he, according to the (somewhat schismatic) drawing of Lent and that of Waldeyer, maintains that the odontoblasts arise by the coalescence of several cells. In another passage he says that the increase of the odontoblasts consists in a prolongation back, viz. towards the papilla, by which means the cells gradually become small and filamentous. He denies the existence of Waldeyer's communicating processes with the papilla, because he did not see in this situation anything but round terminations.

As to the processes respecting the future dentinal fibrils the investigations nearly agree. Lent was the first who got the idea of considering certain parts of dentine as fibrils; only he mistook the tubes for such. To Tomes is due the merit of having first given a description of real "soft tissue in the dentinal tubes"; and subsequent inquiries have undoubtedly proved their existence. The sole exception that has been taken to this view is Salter's opinion, which is that the tubes are filled up with a fluid material. After that Beale's investigations proved that the fibrils take their origin from the odontoblasts; whilst Kölliker, by his later inquiries, abandoned his former conclusions concerning the solid nature of the dentinal fibrils, and, by proving the contrary, joined Tomes. Waldeyer came forth with a perfectly independent treatise on this subject, endeavouring to show that the fibrils get their origin from the protoplasm of the odontoblasts in such a way that, calcification having taken place—by which the tubes are produced—the protoplasm remains in the centre of the odontoblast "in the form of soft tissue." Then he adds, that these fibrils are to be found already partly preformed. In particular Waldeyer considers calcification as the special action by which the odontoblasts obtain processes; and it may be said that, while calcification proceeds towards the papilla, the peripheries of the fibrils grow passively into the dentine.

Boll illustrates very clearly in his drawings the dentinal fibrils as they pass through and out of the dentinal tubes. He agrees with Waldeyer in every point. The drawing of Beale shows the fibril starting from the nucleus of the odontoblast. Hertz referring to his illustration,—which also shows the thin fibrils projecting from the tubes,—says that they, looking like little lucid drops, represent the central soft part of the dentinal tubes, which are more solid towards the periphery. Besides, he attacks the theory of the existence of tubular sheaths, which have, by mistake he thinks, been looked upon as fibrils. Partly according with Kölliker and opposing Waldeyer, he says that these processes (fibrils) are the direct continuation of the odontoblasts, and take their origin from its gradual reduction to a small thread, the formative element being nothing else than the "continuation of the membrane." It will be seen that the assertion of Hertz directly contradicts those of Beale and Waldeyer. Wedl, in his excellent work, finds (with the greatest probability) the fibrils to be constructed of thick cortical and tough semi-fluid central matter, the latter being very liable to dry up when exposed to air. Thus we can see his accordance with Hertz.

The nature as well as the development of the dentinal tubes has been in no way less appreciated by different writers. Müller was the first

who proceeded to get, by means of mechanical action, isolated dentinal tubes. He remarks that they are rigid prominences upon the fragments of dentine, which turn translucent and flexible at the end only if treated with concentrated acid : thence he draws the conclusion that they may have an organic basis. Lent first asserted that the tubes are the descendants of the odontoblasts and of their processes. In addition he says that the walls of the tubes are built up from the same material. Kölliker, in his later investigations, finds that the tubes are destitute of any kind of wall, they being nothing else than rooms left behind in the matrix as the cell-vacuum of the odontoblasts, while the rooms are filled up with the fibrils of Tomes. Beale, Robin, and Magitot, treating on dentinal tubes, make the remark that they are of larger diameter towards the papilla than they are at the periphery ; and that they become obliterated in advanced age. Tomes observed the same condition in his investigations of the teeth of man and animals. This circumstance, he thinks, may have led Hertz to assume that the fibrils penetrate next the papilla, while a few only run into the dentine. According to Leydig, the epithelium covering the papilla in snakes forms the tubes by projections.

The literature in reference to our subject has been enriched by a very interesting fact brought

forward by Neumann. He observed upon teeth softened by artificial putrefaction and hot water, that the tubes are provided with separable walls, which must be looked upon not as calcified membranes of the processes inside them, but as the denser and more compact parts of the calcified intertubular substance. Neumann, in his later paper on caries, further demonstrates very clearly the sheaths made visible by disease. The investigations of Waldeyer and Boll coincide in admitting the existence of these sheaths. In fact they have been generally acknowledged. Yet Kölliker and Hertz could not find them. The latter says that the fibrils are lying in their hollows immediately upon the matrix, and there are no other walls that can be distinguished from the former. And again, if the sheaths of Neumann and the intertubular substance be the mutual product of secretion delivered by the dentinal cells, there would be a closer connection between them. Kollmann declares these sheaths to be the elastic borders of the tubes. Tomes, treating on caries, refers to his figure showing softened dentine, and "each tube surrounded by a very thick sheath." Following the explanation of Wedl, the calcified sheaths are nothing else than the homogeneous matrix surrounding the tubes. At last I desire to refer to the chemical inquiry of Hoppe, who proved the tubes to be insoluble even after having

exposed them to the action of boiling water and strong acids, while the intertubular matrix was resolved into gelatine.

The fundamental or intertubular substance presents to us a subject, regarding which there are the most deviating explanations as the results of scientific inquiry. Hertz and Schwann have found the intertubular substance to be of fibrous structure, and that each tubule is running between two fibres. Owen says that the intertubular substance between the pulp-cells is in the first, and the cell-walls are in the second instance subject to calcification. Raschkow offers the opinion that lime is deposited in layers around the fibres growing out of the pulp. He is joined by Lent, who furthermore considers the fundamental substance to probably be a product of secretion furnished by the odontoblasts and their processes. Kölliker subsequently defends this theory in finding the molecules of lime appearing irregularly within the protoplasm of the odontoblasts. Hannover says that the walls of the tubes are produced by the cell-membrane and cell-contents, while their hollow and contents are produced by the nucleus. The deposition of lime salts occurs first in the hollow, then in its walls and the intercellular substance. Waldeyer decidedly denies the existence of intercellular substance between the odontoblasts, and says that

"there is nothing out of the odontoblasts that would be able to calcify." The same is maintained by Boll when he says that "the substantia eburnea exclusively is built up by the chemical and morphological change of the odontoblast." Hertz, on the contrary, asserts that the intertubular substance is furnished either from the axial part of the pulp or from the dentinal cells. Then he goes on to say that the slimy intercellular substance becomes transformed only by-and-by; viz., not contemporarily round all cells of gelatinous substance destined for the reception of lime salts. Tomes, agreeing with the investigations of Waldeyer and Boll, says "there is no room for intercellular substance." Kollmann accepts the reasoning of Kölliker and Hertz, and, adopting the theory of secretion, adds that the odontoblasts are only *intermediate* subsidiaries to the secretion of lime. Against the action of the odontoblasts he yet brings forward results which he obtained with carmine. He found that while the cells became stained, the youngest matter connected with the intertubular substance scarcely received any staining, or even remained untouched. It may be mentioned that by his inquiries Muhlreiter came to the strange conclusion that the development of the dentine is effected by the blood-vessels of the pulp in such a manner that the odontoblasts take but a "passive part."

He attacks the theory of calcification maintained by Waldeyer. Wenzel gives utterance to an opinion similar to that of Kölliker and Kollmann, and comes to the conclusion that the product of the odontoblast consists first of a transparent, homogeneous, bright, reticular lamella, upon which the lime salts are deposited. The odontoblasts, he says, are so closely crowded together that the existence of any intercellular matter is excluded. By his exact illustrations he is the most convincing defender of Kölliker's secretory theory. Leydig mentions some secretory homogeneous layers capable of taking up lime, which, in his opinion, furnish the fundamental basis for dentine. Finally, according to Heinacke, the origin of dentine is due to the immediate calcification of the connective fibres of the papilla.

My own investigations concerning this matter lead me to the conclusion that in the evidence and explanation of the development of dentine, there may be a deficiency, which is easily to be seen, in the literature I have quoted. The cause and reason of such diversity of opinion is, I believe, due to the respective histological recognition of the papilla, or rather of the odontoblasts. I have during five years made microscopic examinations upon, I may say, all parts of the teeth of man and many animals; and I have chosen for the subject of this paper the action of the odontoblast-

cells, because in last September I succeeded in making preparations whereby, I think, a little more light can be brought to bear upon the still obscure question of the development of dentine.

The preparations I now specially refer to were taken from a child five years old, two or three hours after death by accident. It contained six well-preserved temporary teeth, with the upper jawbone itself. It was placed for a short time in a solution of bichromate of potash and spirit. The embryonic permanent canine and biscuspid were carefully removed from their bony crypts close above the temporary canine. Then I put the stony-like germ upon an object-class, peeled off the superficial layer with a sharp cataract-knife, took some drops of carmine, and hastened to put it in glycerine under the microscope; the most particular care being observed all the time. The fluid I am wont to use in cases where time is an object, consists of some drops of Beale's solution and Schweiger-Scidel carmine well stirred up till it gives out a little acetic smell. The preparation should be placed upon the point of a needle, and the staining fluid applied; then, after floating it through water and spirit, it is to be put into glycerine. This treatment requires no more time than a minute or a minute and a half; and it is sufficient to stain very nicely the nuclei as well as the deeper protoplasm.

I was successful in seeing under the microscope a group of perfectly preserved odontoblasts, some of them being isolated and easily demonstrable. These latter are shown in the illustration, fig. 1, A and B. The original drawing from nature (ob-

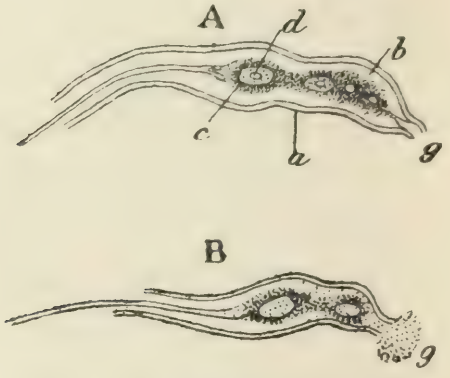


Fig. 1.

tained by the use of ocul. 2, obj. 10, Hartnack), is so very obvious that I shall give only a brief explanation. There may be seen in A and B two complete multi-nucleated odontoblasts; *a* being like a membrane; *b*, a very slightly granular, rather limpid, slimy protoplasm. In the centre of the cell is to be seen the nucleus, or rather, I may say, an aggregation of nuclei. This nucleus contains a coarsely granulated, ill-defined and contourless protoplasm, *c*, in the centre of which we may see inclosed oval nuclei, and in some nucleoli, *d*; on the other hand, the nucleus shows only a coarser granulation. This system of nuclei becomes elongated by measure of Oebshnürung?

which effects between them a protoplasmic connection. One can distinguish on the outer extremity, viz. the process directed to the dentine, that the protoplasm of the nucleus, or, I may say, nucleated cell, becomes elongated into a projection, *f*, fig. 2. Again, we see on the other process, looking to the tooth-germ, that from the last nucleated cells there proceeds through the small space left in the membrane a filamentous connecting process with the germ. The second specimen (B) shows that part quite round and complete. It has also been seen at *g* that the small aperture alluded to in the former specimen is here more gaping and surrounded with protoplasm, which gushed out in consequence of experimentally executed knocks upon the object-glass.

The astonishing part of this discovery consists in the character of the specimen being contradictory to every description yet published. Search for the truth, and moral duty compelled me to inquire into the accuracy or inaccuracy of the above histological appearances. Pressure and blows upon the covering glass, continued for a long time, led me to the conviction that the images here illustrated are strictly normal forms; that is to say, the membrane-like border did not change its shape, though the contour may unmistakably follow that of the nucleated cells; and while the membrane-like part, on its diminishing

periphery, retained its position, the process of the corresponding nucleated cell displayed a very vivid fluctuation. However, if we do not consider it as a membrane, we cannot guess why it did not deviate from the central part of the cell, change its contour, and participate in the floating movements of the free projection *f*. Hence I am inclined to regard the slightly shadowy matter, *b*, as a slimy or gelatinous protoplasm, and the surrounding border as simple membrane. Whereupon to decide is not a matter of easy work, because, although the aperture on the inner pole of the cell be contradictory to the cell theory, it must be borne in mind that the particular subject I am treating upon belongs to an embryonic state of the odontoblast; and we shall see further that the same at a later period has entirely changed its shape. I am not unaware of the antagonism these facts incur with the quoted researches and opinions of Waldeyer, Boll, Wenzel, Kollmann, and, in addition I dare say, with those of Hertz, who is not clear about a genuine membrane. It is strange that Tomes, in spite of his agreement with the opinion of the authors quoted, gives a design after Boll (fig. 131, "System of Dental Surgery") of a fragment of dentine where the communicating odontoblasts apparently look like almost double contours, as I represent them in fig. 2; the preparation having been taken from

the most external pulp-layer of a developing permanent incisor.

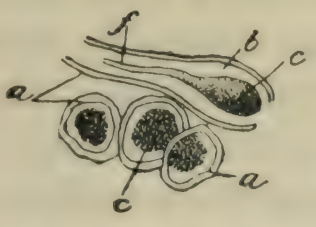


Fig. 2.

In fig. 2 the dentinal cells are of a much later period; consequently their size is smaller than those of the former figure. Why this is I shall shortly explain.

It is necessary to return, as I promised to do, to the drawing of Boll, where there are nerve-fibres projecting between the odontoblasts. I am rather inclined to regard these fibres as the remainder of the membrane (figured at *a*) torn off the odontoblasts, mainly because in the examination of numerous papillæ, I found Remack's fibrils to turn into *marrowless* (*?*) *axe-fibrils;* but I never saw the nerve-network at the basis of the dentine cells which Boll refers to, and which had the appearance of passing between the cells and proceeding into the tubuli. On the other hand, his odontoblasts are torn off just at their eccentric end, and are deprived of processes. It was very unfair for Boll to consider these fibrils as nerves. They may, at that age, have been the rather adherent membrane to the system of nuclei; or

at least such parts of the odontoblasts which, lying nearer to the surface, give out processes.

Boll seems to rely a good deal upon the comprehension of his results by Tomes, who makes mention of sensitive dentine, but who says that there is not sufficient reason to suppose the existence of nerve-fibrils inside the tubuli. Furthermore, Tomes says, "Many animals are endowed with sensation which yet possess no demonstrable nervous system; and we find many points in the human body highly sensitive, without our being able to demonstrate the presence of nerves."

Against the odontoblasts, or (these being facts) rather against the explanation I am inclined to give of them, two objections can be raised; viz., either that, in answer to the declarations of Waldeyer, Wanzel, Boll, Kollmann, and Kölliker, what I am prone to consider as anything like a membrane (see *a*, figs. 1 and 2), is nothing else than the granular rim produced by chemical action (W., W., B.), or the sharp outline (H.) they speak of; or, on the other hand, that it is intercellular substance. I think any one can see at the first glance that there is no reason to look upon *a* in the former light, because what they call granular cell-contour is absent, and a weighty proof of it is that no carmine pigment has been absorbed, although in the reverse case it must have

done so. Concerning the second objection, perhaps, one would hesitate absolutely declaring *a* to be a fibre of connective tissue; that is, intercellular matter. And really fig. 1 would admit such a supposition; but we shall see farther on that it is only exhibiting one stage of development. Notwithstanding, if we look at fig. 2, where the dentine-cells in transverse section clearly demonstrate a distinct outline running all round, the protoplasm being inclosed, I think one must confess its membranous nature. Moreover, the weightiest proof to my mind is afforded by the already-mentioned authors, when they, jointly with Tomes, deny the existence of intercellular matter. For Hertz no exception can be made, as he conceives, under intercellular matter, a slimy substance becoming gelatinous, but not a tissue. Quite another thing is the intercellular substance of other writers, as Henle, Schwann, Owen, Leydig (? Heinacke). However, on comparing their assertions it may be found that while Henle and Schwann (rather isolated) find a fibrous structure, they do so in dentine of already developed teeth. On the other hand Leydig and Heinacke speak about connective tissue found, not between, but behind the odontoblasts in the germ.

In the literature I have alluded to, Hannover's is the only work in which mention is made of a membrane to the odontoblasts. Yet, besides this,

he writes on intercellular substance; but, for want of a drawing, I am not sure whether he means that it is the nucleated cells which have a membrane of their own; still, authors do not refer to his work in that sense. I, for my part, completely agree with the writers quoted concerning the intercellular substance, because I was not successful in seeing any connective tissue between the odontoblasts, though a very large number of preparations from the calf, pig, cat, dog, &c., and human embryos, were examined. Yet I did find the papillæ abounding in bundles of connective tissue, only it was not close *behind* the *membrana eboris*—the layer of odontoblasts. If we very attentively take a view through the microscope of a sufficiently broad lamella of embryonic dentine with its cells, we shall find that the odontoblasts, closely arranged in a row, are surrounded by a distinct contour, which continues and coincides with the line of intertubular substance, and makes itself remarkable by its resistance against solvents. The same has been observed by Kollmann. If the lamella remains adherent to the surface of the papilla, it will not be difficult to recognize in a good section that these fibrillous oval clubs of protoplasm are lying in hollow chambers with a clear border of the already-named kind. Yet one can be better persuaded of this state of things in places where, in consequence of

any mechanical disturbance, the club of protoplasm is to be seen pressed out of its frame. The former is the generally known odontoblast; the latter should, in my opinion, be regarded as the membrane to it. The fact of this opinion being opposed to the views of most of the authors quoted may be explained by the fact that the odontoblasts, by the slightest pressure or by being pulled, slip out of the sliding frame or membrane in which they were imbedded, and follow their more resistant fibrils fixed into the tubes of the fragment of dentine. This is the reason why we very frequently find clinging upon such a fragment quite naked odontoblasts, which not unfrequently have lost even their nuclei; they having been torn off.

With regard to the origin of the processes—that is the dentinal fibrils—I may revert to my experience, according to which they are the direct continuation, the only settled and elongated protoplasm, of the nucleated cells. Again, as to the nucleated cells two opinions can be expressed; viz., either that they issue by endogenous cell-formation, or (and this I maintain) by the coalescence of the protoplasm of varieties of embryonic cells of the connective tissue. A good proof of this latter fact is given by fig. 1, A, where it can be seen that the last nucleated cell is projecting by a short process through the aperture of the odontoblast, which cannot point to anything else

than the mode of its derivation from the round cells of the papilla. Moreover I have seen in early embryonic preparations these round cells clustering into columns. Therefore, in accordance with Hertz, I hold that the nucleated cells take their origin from the coalescence of the protoplasm of the round cells; and the fibrils, on the other hand, from the protoplasm of the last eccentric nucleated cell. But I must remark, in opposition to Hertz, that I have never seen in this place the sharp border of protoplasm he refers to as engaged in that proceeding. Of the destiny of nuclei I can state that they disappear by the process of the development of the fibril, and probably by dissolution into the surrounding protoplasm. Although there are odontoblasts upon the pulp-surface of completely developed teeth, yet they are uni-nucleated and shrunken.

After all I conclude, as to the lot and destiny of the odontoblasts, in the following way:—the gelatinous protoplasm inside the membrane gradually becomes consumed by means of precipitation of calcareous salts in the formation of dentine, beginning at the periphery, whereby the cell at this place becomes reduced to a smaller size. The dentine acquires its solid substance exclusively by the slimy or, agreeing with Waldeyer, gelatinous protoplasm of the odontoblasts; while the nucleated cells are destined for the delivering of the

fibrils. The most difficult question to be answered is, that whether, as in fig. 1, we have to deal with a real membrane or not. The fact is that our histological cognition of membranous cells is in straight contradiction with a membrane showing an aperture at both poles, without the intermediating part at the orifice. And I confess that I am not in a position to overbridge the difficult point in any other way than by referring to fig. 2, where the forms strictly harmonize with the exigencies of histology. One can see that there is a double contour disc, in the middle of which granular protoplasm is crowded. Again, one can see that even the shrunken, or perhaps partly dropped-out protoplasm, makes the contour more distinguishable. I should think, in respect to these facts, nobody would endeavour for a long time to assume the existence of a membrane to the odontoblasts. Notwithstanding that, suppose I were wrong, there would still remain the question, in what sense is the contour line in both figures to be considered ? I think no anwer will be more correct, or rather exclusive, than to say that it is an intercellular substance. Only one single glance at fig. 2 would dismiss such a supposition. Still the remaining question is, how to give an explanation of these facts—facts I say, because the demonstrated figures are true copies of the forms found under the microscope.

The examination of my microscopical preparations from earlier periods of development enabled me to attain to a satisfactory view. I shall give a short account of my opinion. The two figures represent different stages of development, fig. 1 being an early stage, and fig. 2 a much (several months) later one. By very careful, attentive, and minute examination of a large number of other preparations, I have been enabled to see several spots which have led me to the conviction that the membrane of the odontoblast by degrees closes the aperture, and approaches the central protoplasm, or original nucleated cell, which is employed in the process of development, till, at the margin of the already developed dentine, it closely covers the remainder of the protoplasm and also the nucleus, if it be yet preserved. If preserved I say, because the latter appears in some specimens to be finally consumed in engendering the fibril, on the end of which no more can be seen than a small cylinder of protoplasm. To obviate being misunderstood, I repeat what my latter words point out only, the synchronicity of the gradual consumption of the cell as well as its nucleus.

I shall now consider the process of calcification. In all probability the membrane is in the first instance affected and consolidated by the secretion of calcareous salts, and that serves as the prefor-

mative wall for the deposition of the probably transforming protoplasm within it. In this way, I fancy, is built up first the intertubular substance and then the walls of the tubes. By the examination of early embryonic preparations may be seen the perfect continuity of the membrane with the intertubular substance, while the next lying protoplasm is directed to the neighbouring line of the fibril; though the regular confluence of these into one another rarely admits a distinction. The exposition is very clearly helped by the fact that the tubuli are situated in a very parallel system; and I think it would hardly be the case if the dentine be the descendant of a diffuse calcification of the protoplasm, in the centre of which there would remain a soft part in order to represent the dentinal fibril, as has been maintained by Waldeyer. That which concerns the theory of the taking up of lime salts by protoplasm, in the same way as experiments with albumen have exhibited, I am inclined to accept; and to agree with the opinion expressed by Tomes.

## Discussion.

The President said they would all agree in thanking Dr. Arkövy for his elaborate and clever paper. It was a subject of interest, especially to those who worked at dental histology, and they would be glad to hear the opinions of any such gentlemen then present.

Mr. Moore said the views of Dr. Arkövy coincided with his own, especially in regard to the contents of the dentinal tubuli and the condition they presented in advanced life, when they became calcified.

Mr. Sewill hoped Dr. Arkövy would not be disappointed if he did not hear much discussion on his paper. He (Mr. Sewill) rose to offer a remark which might excite some further observations. Dr. Arkövy had only described human preparations—he wished to ask whether he had examined the embryonic teeth of mammals, and if so whether he found exactly the same appearances. If he could get some preparations from sheep and other animals it would tend to confirm his views. The development of dentine was a subject he was doing some small work at himself, and he should take every opportunity of examining the points to which Dr. Arkövy had called attention.

Mr. Ashley Barrett said he should like further information on two points. In the first place, he understood Dr. Arkövy to draw a distinction between the material of which the walls of the dentinal tubes were composed and the intertubular substance. On what grounds was that distinction based He observed, when treating dentine with dilute hydrochloric acid, that when the whole of the phosphates—the earthy matter composing the dentine—had been dissolved, an organic

matrix was left, apparently so homogeneous that, in point of fact, it resembled roughly a block of marble through which a number of more or less parallel tubes had been drilled. The second point referred to what he believed was a very vexed question, namely, the sensibility of dentine. He should like to hear Dr. Arkövy's views on that subject. It was a point that had been very much discussed, and about which there was a great variety of opinions. His own opinion, not based perhaps on very extensive observation, was this, that the nerves within the pulp-cavity were conveyed through the dentinal tubes, and that the organic filaments which Mr. Tomes observed when fracturing those dentinal tubes, projecting from the ends of the tubes, were the prolongations from the dental nerves within the pulp-cavity; and moreover, that the tooth did not reach maturity until a very advanced period of life,—until the age probably of sixty, when the dentinal tubes were blocked up, and the nerve within the pulp-cavity was converted, more or less, though generally entirely, into mineral matter.

Mr. Alfred Coleman said, without wishing to put himself in Dr. Arkövy's place, he might observe there was this difficulty with regard to Mr. Ashley Barrett's view, viz., that, with the exception of Boll, no one, he believed, had pretended yet to describe any communication between the nerves which enter the pulp and the contents of the tubuli, and he thought Boll's view of the matter had been satisfactorily explained by Dr. Arkövy. He would admit that on one occasion, in a preparation obtained from a calf, it did appear that he could trace something that appeared to be a communication between the bundles of nerves ramifying throughout the pulp and the odontoblasts, but the elements of communication did not resemble nerve-fibres.

Mr. Gaddes said the subject brought forward in the paper, which was more or less opposed to that which was generally recognized, was the presence of a cell-membrane, a membrane of the odontoblast. The writer of the paper did not demonstrate or make mention of any membrane to the cells which

he called the round cells, beneath the odontoblast. How far, then, was the membrane, that he demonstrated upon the odontoblast, due to the transformation of the bioplasm of the odontoblast? How far was it transitional between the bioplasm and the calcified form of the material of the matrix? That seemed the only thing new in the paper,—the presence of this membrane in the odontoblast. What that membrane was other than the simple form of material of Beale, he should like to know. Dr. Arkövy called the nuclei, the round cells, the odontoblast proper; and if he (Mr. Gaddes) mistook not, the membrane of the odontoblast,—all by the generic term of protoplasm, using the word as was advanced by Huxley. Lionel Beale, since that time, had divided the word protoplasm into bioplasm and formed material. The protoplasm of Huxley was meant to convey that which had lived, and was now dead, and also that which was living. There was then the bioplasm, and the membrane or intercellular substance or matrix; and it was rather confusing to know what was the living part of the cell, or of that which he termed the protoplasm, in contradistinction from that which had been formed and was now dead—dead in the sense that it could not appropriate either living matter, or food to itself, nor propagate itself in any way.

Mr. Oakley Coles said Mr. Charles Tomes very much regretted his inability to be present that evening, but would take the opportunity of making some reference to the paper at an early occasion, as he had been recently working at the subject under discussion.

Dr. Arkövy, in reply to Mr. Sewill, said it was quite true that he did not find the membrane in rats or the lower mammals, and in the higher mammals there was only a slight indication of it. This might be explained by the supposition that very small odontoblasts did not need so great a cell-membrane for the composition of the dentine; the process was very simple, the odontoblasts were very small and very numerous. In the human specimens it was not the same; the odontoblasts were very close, but not in such close relations as in animals,

and not so numerous. With reference to Mr. Gaddes' inquiry whether the membrane was living protoplasm or not—and he (Dr. Arkövy) was unable to make a distinction between them —every membrane took its origin from protoplasm.

Mr. GADDES said his question was as to the difference between the membrane and the intercellular substance or matrix, or fundamental tissue.

Dr. ARKÖVY said he had pointed out in the paper that there was no connective tissue between each odontoblast; the connective tissue was behind the germ of the dentine only, and not between each odontoblast. In reply to Mr. Barrett, he said the membrane might be taken as the first fixed point upon which lime salts were deposited; and this fixed wall being the first hardened by lime salts, the gelatiuous matter inside of it, by the process of deposition or secretion of lime salts, deposited itself in that first wall; and so the membrane of the odontoblast was nothing else but the intertubular substance, and the other part of the protoplasm was inside of it. He believed that was a plain explanation of the development of dentine.

The PRESIDENT said he would ask the members, after the meeting, to examine the centrifugal pump exhibited by Mr. Wheeler, of Southsea. He might again return thanks to Dr. Arkövy for his very excellent paper; also to Mr. O'Meara for his contribution, to Mr. Davidson for two volumes of Delabert, and to Mr. Woodman, Mr. Moore, and Mr. Ashley Barrett for their communications.

The meeting was then adjourned to the 5th of March.

# GENERAL MONTHLY MEETING.

*March 5th*, 1877.

SAMUEL CARTWRIGHT, Esq., President, in the Chair.

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The Minutes of the previous Meeting were read and confirmed.

The following gentlemen were elected Members of the Society :—

Mr. Joseph Harrison, 14, St. James-street, Sheffield, Non-Resident.

Mr. James Joseph Simmons, L.D.S., 18, Burton-crescent, W., Resident.

The following gentlemen were nominated for Membership :—

Mr. Benjamin E. Manville, M.R.C.S., 5, Grosvenor-street, Resident.

Dr. Arkövy, Master of Dentistry, M.D., &c., Budaphest, Non-Resident.

The President then announced the following contributions to the Library :—

Wardroper on "The Pernicious Practice of Tooth-drawing";
Hill on "Reform in the Dental Profession"; and
Snell's "Practical Guide to Operations on the Teeth";
all presented by Mr. Petty.

Mr. Stocken exhibited two models showing deformity and malposition of the wisdom teeth; also one from a child six and a half years of age, in which one anterior bicuspid could be seen just erupted, and the other just piercing the gum. He remarked that in Tomes's Work there was a Table, contributed by Mr. Cartwright, in which it appeared that out of 340 cases, an anterior bicuspid was only erupted over at that age, and a posterior bicuspid in four cases.

Another model was from a child five and a half years old, in whom one of the first temporary molars was pushed aside, and a bicuspid could be seen just erupting beneath it. In this case the molar was much necrosed, and the gum around it had become inflamed; the new bicuspid also was loose and very imperfectly formed,—a mere cap of enamel. It had to be removed.

The President, in thanking Mr. Stocken for bringing forward the specimens, said that he himself had kept the record of cases at the Children's Hospital, and could vouch for the accuracy of the table given in Mr. Tomes's book.

Mr. Oakley Coles called the attention of the Society to a novel application of Messrs. Corbyn's spray-producer, a little instrument which had been introduced by them as a ready mode of applying medicated lotions to the throat. Mr. Coles had found it very useful for washing-out cavities: it did this very quickly and perfectly, did not fill the mouth with water as did a syringe, and there was no risk of making the gum bleed, and thus obscuring the work, as was the case when pointed instruments were used.

The President then called upon Mr. Weiss to read his paper.

Mr. President and Gentlemen,

The members of this society will, no doubt, recollect that at the December meeting I brought before them, as a casual communication, "Artificial teeth swallowed or impacted in the pharynx." In the discussion that followed some remarks were made calculated to lead the members to believe that these cases are of such rare occurrence that they are very seldom recorded, but Mr. Thos. Rogers at the following meeting in January stated that he had obtained a list of similar cases from the medical journals, and suggested that an abstract be published in the "Transactions," as many of the members might like to refer to them, without caring to hear them read *in extenso*. This suggestion the meeting adopted, and eventually the matter was left in my hands. I wish this evening, with your permission, to make some observations on the summary I have prepared, and although it is not my intention to read all the cases, I desire to enter more particularly into the general treatment when such accidents occur; and I may here observe that many of the numbers of the medical journals containing accounts of these cases are out of print, so that it becomes

the more desirable that a record be preserved, that members of our profession (more particularly in the country, where surgical aid is not so readily obtained) may be informed as to the best course to pursue where a foreign body has become impacted in the pharynx, or the treatment to adopt when it has found its way into the stomach.

I have, in all, been able to report twenty-five cases; some are recorded *in extenso*, and some I have only alluded to. The difficulty I have had to contend with is not from the paucity of cases, but their number and similarity, and I feel justified in stating that this accident occurs more frequently than members of this society would readily believe; and I think we should have no difficulty in collecting in England alone, if we desired it, at least fifty well-authenticated cases, and this, I have no doubt, the discussion of this evening will substantiate.

# A Summary of Cases where Artificial Teeth have been Swallowed, or have become Impacted in the Pharynx.

COMPILED, WITH NOTES, BY

FELIX WEISS, L.D.S.

*Suggested for Publication in the "Transactions" by* Thomas Arnold Rogers, M.R.C.S. L.D.S., &c.

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The accidental swallowing of artificial teeth, although of rare occurrence, is occasionally met with, and presents many points of interest, not only to the general medical practitioner, but also to the dental surgeon. An account of the best recorded cases and their treatment cannot therefore fail to be interesting to the members of this Society. The event is one attended with considerable danger to the patient, and has in some cases ended fatally.

"The lodgement of foreign bodies," Sir James Paget observes, "in places where they are least likely to be, may produce symptoms very similar to those of organic disease;" while the remova of artificial teeth from the pharynx or the œsophagus with forceps, or by the operation of pharyngotomy or œsophagotomy, is a proceeding

requiring great skill, considerable firmness, and an intimate knowledge, not only of the surrounding parts, but also of the character of the artificial work likely to cause such mischief.

For the convenience of reference these cases may be divided into four classes :—

1. Where artificial teeth have got into the pharynx, œsophagus, or stomach, and been successfully removed with forceps, &c.
2. Cases in which the knife has had to be used.
3. Cases where Artificial Teeth have been swallowed, and passed by the patient; or ejected: and,
4. Where Artificial Teeth have been swallowed and forced into the stomach; and cases where death has ensued.

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## Class I.—Where Artificial Teeth have got into the Pharynx, Œsophagus, or Stomach, and been successfully removed with Forceps, &c.

### CASE I.

*A Case in which Artificial Teeth were lodged between the Tongue and Epiglottis.*

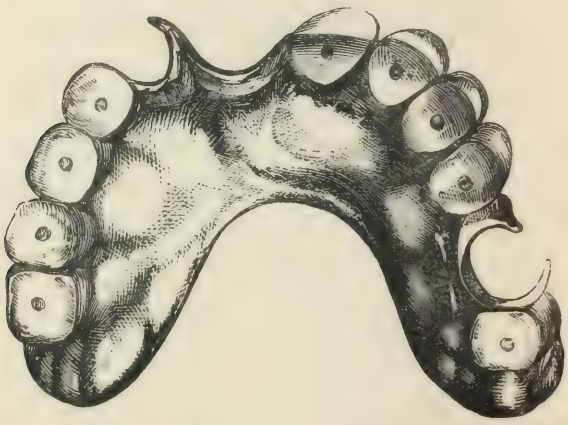
Communicated to the *Medical Times and Gazette*, January 18th, 1862, by Sir James Paget.

In July, a gentleman, sixty years old, after being engaged all day in more than usually fatiguing business, and exposed to cold air, felt faint and ill in the evening, and went to his bedroom

at the hotel in which he was staying. While lying down, faint, or, perhaps, in the beginning of a slight epileptic seizure, he asked the servant to take out for him his artificial teeth,—nearly complete separate sets for the upper and lower jaws. The servant, he believed, took them out. Of what immediately followed he could remember nothing more than that he became much more ill, with difficulty of breathing, and a sense of choking and suffocation, in which, in great anxiety and alarm, he sent for medical help. He was found suffering with much difficulty of swallowing and some dyspnœa. His tonsils appeared much enlarged and unusually red. These symptoms were treated, and in some measure relieved; and when one set of his teeth was missed on the day after the beginning of his illness, his medical attendants, who suspected that they might have been swallowed, were begged not to speak of them to him, for fear of the excitement and alarm that such a suspicion might excite in him. All the severity of his symptoms being subdued in a few days, the patient returned to his house at Rhyl, where Mr. Theed, as usual, attended him. For the first few days, Mr. Theed saw appearances of slight inflammation of the fauces, but these soon subsided: from that time nothing morbid could be seen in his throat He had considerable and increasing difficulty of swallowing, was obliged to drink very slowly, and to cut all his solid food into very small fragments, and force them down his throat with gulping. Occasionally he was almost choked by food becoming involved in a tenacious mucus, which appeared to be secreted in large quantity at and beyond the fauces. Occasionally, also, he vomited after taking food. He had frequent short, "hacking" cough; and once or twice hawked up a little blood. He suffered no considerable pain; but felt constriction about his cricoid cartilage, and always referred to that part as the seat of obstruction hindering his swallowing. His voice was rough, and rather hissing; his breathing sometimes with wheezing.

Many times, while watching these symptoms, Mr. Theed suspected that they were due to some foreign body in or near the larynx: but he could see none; and the patient, as often as inquiries were directed to this point, declared somewhat impa-

tiently that the thing could not be. Especially when with the tardily-given permission of his relatives, he was asked if the false teeth, which he had lost on the night of his illness, might not have slipped into his throat, he maintained that it was quite impossible; for what he had lost was a whole upper set which, he believed, had been unluckily thrown away with the water into which they were put at night. The piece was far too big, he said, to go into his throat, or to be there without his knowing it. However, as none of his symptoms diminished and he was becoming very thin and feeble, Mr. Theed, in November, brought him to London for consultation. His feeble appearance, his dull, pale face, his emaciation, and the recital of his case, made me fully expect that he had cancerous stricture of the upper part of his œsophagus. On examining his mouth and fauces, I could see nothing unnatural till, on extremely depressing the back of the tongue, I saw something white near his epiglottis—but too obscurely to guess what it was. Passing my finger to the side of the epiglottis, I felt teeth there, and soon hooked out the whole lost set, of which, with their gold palate-plate, and other fittings, the adjoining sketch will tell very well the size and other characters.



The piece lay between the base of the tongue and the epiglottis, very closely fitted to all the surface on which it rested. The teeth were directed upwards, and I believe the incisor teeth

were next to the epiglottis, and the notch in the palate-plate next to the root of the tongue.

The most remarkable point of this case, next to the fact of the patient being unconscious for more than three months of what he had in his fauces, is that a thing so large as that which the sketch shows could be out of sight at the root of the tongue. It may be well, therefore, to repeat that it was completely invisible, except when the base of the tongue was exceedingly depressed, and even then only a small part of it was obscurely seen. To this, and to the patient's dread of any other examination than that with the eye, it must be ascribed that the lost teeth were not discovered long before I saw him.

It may be worth notice, that the patient referred to the parts about the cricoid cartilage, as the place of obstruction in swallowing. This may be an instance of transference of morbid sensation, similar to that by which the irritation that excites coughing, wherever its true seat may be, is felt as if it were at the top of the larynx. A similar deceptive transference of sensation was observed in a lady whom I saw with what I supposed to be cancerous stricture of the upper boundary of the œsophagus. She always pointed to the cricoid cartilage as the place of obstruction: but her disease proved to be a cancerous ulcer of the tongue immediately in front of the epiglottis, and her pharynx and œsophagus were healthy.

Since the removal of the displaced teeth, the patient has regained health, and Mr. Theed's last report of him is "I think him as well as before" the accident.

P.S.—Since this narrative was in print, Mr. Theed has written that the patient has had "a very severe attack of epilepsy, which lasted for five or six hours, during which time the convulsions were so violent that if I had not removed (though with great difficulty) his *full* set of teeth, he would inevitably have broken them into pieces. This, I think, elucidates the previous mystery."

## CASE II.

### *A Case where an Artificial Plate with False Teeth was Swallowed and Removed.*

Communicated to the *Lancet*, May 13th, 1871, by Dr. JOHN MATTHEWS.

On the night of Sunday, March 26th last, I was called up at 1.30 A.M. to see Mrs. G. J——. The messenger only waited to say that she was choking, and ran off. On arriving at the house, I was informed that the family had been aroused by the screams of the sufferer, who was liable to frequent epileptic fits. On reaching the bedside, she was found clutching at her throat, labouring for breath, and partially unconscious, having evidently just had a severe attack. She could not swallow, nor speak much above a whisper. It was then observed that a plate holding six artificial teeth, known to be in her mouth when she went to rest, had disappeared. As it could not be found anywhere, the inference naturally arose that she had swallowed it during her fit; but of this we were uncertain, since she very often misplaced or hid articles of dress, ornaments, &c., during the half-consciousness succeeding her attacks.

I immediately introduced a finger as far as possible down the throat, but could feel nothing, although it reached below the glottis. The patient was so much distressed by this, that I only repeated it once with a finger of the other hand; but to no purpose, nor could any prominence be felt externally. In the absence, therefore, of absolute proof that she had swallowed the teeth, I thought it might be an aggravated case of hysteria or epileptic spasm of the pharynx; and, having prescribed accordingly, left her for a few hours, enjoining a more careful search for the missing teeth. On visiting her at 10 A.M. on Monday, I found matters *in statu quo*. She had not been able to swallow either food or medicine; but the dyspnœa was not so severe.

I then explored with both fingers; but to no purpose, and left, expecting that if the plate were there it would slowly find its way into the stomach. At 2 p.m. no alteration; teeth not found. I then proposed a consultation with Mr. Holmes Coote; and he accordingly saw her at 6.30 p.m. He also was in considerable doubt as to whether the teeth were there or not, since he could not feel them either by the finger or a pair of long forceps which he brought with him. I may add, that our efforts were seriously impeded by the strenuous resistance of the sufferer, especially with Mr. Coote; and she finally declared that she would not suffer him to touch her any more, otherwise I have no doubt that he would have relieved her. We then left, having directed a dose of castor oil to be given in the morning.

On Tuesday morning I visited her. The castor oil ordered could not be taken, and she was still in so much distress that, after a gentle remonstrance, she promised to be more submissive to further exploration. This I attempted still with the finger, feeling sure that the obstruction was within its reach, if her description of her suffering were accurate as to place. On this occasion the left finger went further than before, reaching about an inch below the glottis (I had previously used the right finger without success); and I then had the satisfaction of feeling with my nail the edge of the plate. The patient was gasping for breath during this proceeding; I therefore removed my finger, and after a brief interval reintroduced it, sliding down at the same time, close to it, a pair of polypus forceps, by which I was able to grasp the thin edge of the plate, which was lying with its long axis transversely, its hollow closely applied to the back of the trachea, the teeth downwards. Finding it immovable except by much force, and unwilling to risk laceration of the œsophagus, after another brief interval I once more inserted the left finger and forceps, grasped the plate, and then slid the forceps to its other end, so as to tilt it by the aid of the finger, when it was at once easily extracted. All the symptoms were of course immediately relieved. There was very little, in fact scarcely any, bleeding; and in two days the patient was as well as usual.

The accompanying woodcut is from a photograph of the plate, of the exact size. The view shown is of the part towards the patient's back, the thin edge being uppermost.

I have been asked why, when I could not *at once* feel the plate with the finger, I did not explore with a bougie or a probang. My reply is—1st, that I never use an instrument when there is the least chance of a finger being successful; 2nd, that I had reason, as I have before said, to think that it would prove to be within reach when the sufferer was quieter; 3rd, that I always found the glottis so open that I should very likely have pushed such an instrument into it; and, lastly, because I did not like to run the risk of pushing the plate down into the stomach. I cannot help thinking this likely to be a very dangerous event (or proceeding), not only from the probability of laceration of the œsophagus by the angles and edges of so large a foreign body, but still more from the chance of its producing a fatal intestinal obstruction, not to speak of the very great anxiety of mind inflicted on all concerned until it shall have passed, if it eventually do.

I think we may learn from this case not to give up an apparently hopeless effort too hastily, and that epileptics should not wear artificial teeth when going to sleep or at night, or indeed at any other time, unless properly secured from displacement.

## CASE III.

### *Artificial Teeth Swallowed, Detected in the Stomach, and Extracted.*

(*The Lancet*, Feb., 1870.) Mr. L. S. Little's Case.

Mr. L. S. Little read at the Royal Medical and Chirurgical Society, Feb. 8th, 1870, a report of a case in which a plate with artificial teeth was swallowed, detected in the stomach, and extracted. A woman was admitted into the London Hospital who two days previously during an epileptic fit had swallowed a gold plate to which some artificial teeth were attached. This produced so much irritation that no food had since been retained, and as the foreign body could readily be felt in the stomach by means of an ivory-tipped probang, Mr. Little passed an ordinary œsophageal coin catcher, and after several attempts succeeded in hooking the plate and drawing it up as far as the pharynx, where it lodged. Considerable difficulty was experienced in removing it from this situation, although it was ultimately effected, and the patient recovered without any bad symptom. The plate, which had sharp projecting extremities, measured $1\frac{3}{4}$ inch in length by $1\frac{1}{4}$ inch in width, and fixed to it were three incisor teeth, one canine, and one bicuspid. The author advocated attempts at extraction in similar cases, urging that if a foreign body has passed down the œsophagus and through the cardiac orifice of the stomach, no great difficulty will be met with in its withdrawal through the same passage, provided no force be used, and he referred to some experiments made by Mr. Pollock to show that the removal from the stomach of even a small plate by the natural efforts is very improbable.

## CASE IV.

*Foreign Body in the Œsophagus.*

(*Medical Times and Gazette*, Dec., 1857.) Communicated by a Provincial Practitioner.

I was awoke at midnight by a patient who, when admitted, could only crawl in and sink upon a chair, at the same time with ghastly countenance, pointing to her throat, ejaculated, "Swallowed teeth." I examined the pharynx and œsophagus, but for some time in vain, the teeth were beyond my grasp, until the retching produced by my finger raised them, to sink again instantly.

I took a long pair of curved polypus forceps, oiled my left forefinger and drove it deeply in the gullet, following this finger with the forcep-blades, opened them, and straightway withdrew from its awkward situation a full-sized gold upper plate, on which were eight artificial teeth with a pivot half an inch in length. That this had scratched the lining membrane seemed plain enough; a streak of blood, much after-pain, and many days' dysphagia, spoke of some mischief done, but all was soon well again. The patient acknowledged that once before she had found the teeth loose in her mouth upon waking. On this occasion failing to extract them from her throat, she had made the rash attempt to swallow them entire, in which she would, no doubt, have succeeded but for the sharp pivot-pin, by which it lodged itself within her gullet, at least half-way down.

## CASE V.

*Impacted Denture in the Pharynx.*

Communicated by Mr. Felix Weiss; "Transactions of Odontological Society," December, 1876.

This case has been so recently brought before the Odontological Society that it is hardly neces-

sary to introduce a summary of it here. It may, however, be interesting to see an exact facsimile drawing of the artificial teeth—perhaps the largest piece of work that has ever been recorded as passing into the pharynx.

## CASE VI.

*Impaction of a Plate of Artificial Teeth in the Pharynx during a period of Five Months.*

Communicated to the *Medical Press and Circular* by Dr. GEOGHEGAN, March 14th, 1866.

A gentleman about 60 years of age requested me to inspect his throat, which his friends feared was about to become the seat of cancerous disease. I learned that five months previously he had been seized, *whilst in bed*, with difficulty of breathing, and a sensation as if a bit of rough cane was moving up and down in his throat.

He found that liquids and pulpy matters could be swallowed, but that deglutition of solids had become impossible. Matters had so continued up to the period at which I was consulted.

He now evinced slight hoarseness, and there was unusual fulness, with increased breadth externally in the situation of the base of the tongue and of the pharynx. The foreign body could now, however, be defined from without. Great relief was obtained from the application of a blister to the neck. An experienced practitioner who was called in at the time of the occurrence was informed that no cause except "cold" could be assigned in explanation of the symptoms. Being unaware that a plate of false teeth had been habitually worn, and the patient himself not having volunteered any statement upon the subject, the greatest difficulties interposed in the attempt to estimate the real nature of the case.

On inspecting the fauces, I could discover nothing more than the increased vascularity so commonly observed in the throat of an habitual smoker. Passing my finger well down the epiglottis, I at once encountered a hard body, which on further examination was found to traverse the entire breadth of the pharynx, and to have become impacted there, owing to the entanglement of its sharp and projecting extremities in the opposite sides of the canal. A curved catheter wire, when caused to strike the foreign body, elicited a clear ringing sound. An attempt to move the body caused efforts to vomit, spasmodic cough, and the ejection of abundant mucus, tinged with blood *of an arterial tint.*

With the above phenomena before me I inquired whether at any of his meals he was conscious of having swallowed any hard or unusual substance? To this he replied in the negative, but then, apparently for the first time, recalled the fact, that on rising in the morning following the occurrence he had missed *his tooth plate*, and stated that he imagined he had dropped it, and it had been thrown away by his servant, he therefore dismissed the matter from his mind. The cause of the mischief thus stood revealed.

Having explained to the patient the risks that might be expected to attend on the attempt at extraction, I proceeded to operate. In the first place I tried to disengage the ends of the plate, having passed a stout and well-curved catheter wire beneath its centre. Eventually I used a pair of polypus forceps

through an opening in the plate where two incisors were wanting, and happily its removal was crowned with success.

The plate proved to be a vulcanite one, and had on it five artificial teeth. The removal of the offending body was speedily followed by the disappearance of the chief symptoms; but even seventeen months after the accident uneasiness was felt at the right side of the neck, and solid food, unless well masticated or in small volume, requires to be washed down by a mouthful of fluid.

## CASE VII.

*Large Gold Plate, with Seven Mineral Teeth and Three Clasps, impacted in the Pharynx.*

Communicated by Mr W. R. Wood, L.D.S.

Miss C., an epileptic patient, accidentally swallowed her artificial teeth at 8 o'clock in the morning.

They fixed themselves low down in the pharynx, and Dr. Graham, of Weybridge (where the lady was stopping at the time), not having suitable instruments, sent for Mr. Thomas Smith (Bartholomew's Hospital), who arrived at 6 p.m. the same day, and with a long pair of pharyngeal forceps removed them. He had to use great force, and considered himself justified in doing so, as the teeth had been so recently swallowed, and no ulceration of the mucous membrane could have

taken place at so early a date. The patient had no bad symptoms, and although the throat was considerably lacerated, she made a good recovery.

The gold plate is $2\frac{1}{4}$ inches by $1\frac{1}{2}$, the length of the external circle being exactly 4 inches.

## CASE VIII.

*Vulcanite Suction-plate, with Five Teeth, impacted in Pharynx.*

Communicated by Mr THOMAS SMITH.

Eliza B., æt. 22, came under my care at St. Bartholomew's Hospital on the 3rd of January last. She had been disturbed from her sleep the previous night by pain in the throat, and on examination she missed from her mouth the artificial teeth she had been wearing. On admission to the hospital, she complained of great pain and sensation of choking, and could only swallow fluids with great difficulty.

On pushing my forefinger far down the throat I could just touch a hard surface, evidently some foreign body. Taking a pair of strong curved œsophagus forceps, I managed to seize this substance, but could not dislodge it without using undue violence. After three or four attempts, I succeeded in drawing the teeth so far upwards, that with the left forefinger I could push back the pharyngeal wall, and liberate the entangled denture.

The foreign body consisted of a vulcanite suction-plate with five teeth attached. The girl had for a few days great pain in swallowing, and seemed very poorly; she, however, insisted upon leaving the hospital, but was glad enough to return on the 8th, and by the 15th was quite restored to health.

## CASE IX.

*Vulcanite Plate, with Teeth and Two Gold Wires, Swallowed.*

Communicated by Mr. THOMAS SMITH.

A young man, aged about 20, called upon me at 2 in the morning on the 23rd of January last, saying that in his sleep

he had swallowed a plate with teeth attached, and two gold hooks, one on either side. He went to bed with it in his mouth, and awoke without it, and said that he could feel it in his throat. I could not discover that anything was there by digital examination. It gave him scarcely any pain, his voice was not altered, and he could swallow fluids. Not having a suitable pair of forceps at hand, I sent him home, and at 9 next morning, without any difficulty, I removed from behind the cricoid cartilage a vulcanite plate with teeth, and two gold wires. No force was required, but a quiet steady pull, and no inconvenience resulted.

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## Class II.—Cases in which the Knife has had to be used.

Operations for the removal of foreign bodies from the pharynx or œsophagus with the knife are of very great rarity, and involve both danger and difficulty. The following case has been so lucidly described that I have thought it desirable to reprint it *in extenso*.

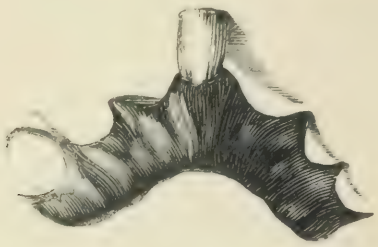
### CASE I.

*Operation for the Removal of Large Artificial Tooth-plate from the Pharynx. Recovery.*

Case under the care of Mr. Cock. (*Medical Times and Gazette*, Feb. 9th, 1856.)

Mr. T. G., aged 22, a highly-respectable tradesman at Dartford, was brought to Mr. Cock's residence on Thursday, January 17, by Mr. Martin, surgeon, of Dartford.

It appeared that for some time he had been wearing a false central incisor tooth fixed to a gold plate, which extended some distance on either side.



The foreign body, which was subsequently removed from the pharynx, may be thus described:—The plate formed the segment of a circle corresponding with the hard palate behind the incisor cuspidati and bicuspides teeth. The one extremity terminated in a slender clasp, with two points as sharp as needles, and encircling the bicuspis tooth; the other extremity formed a single sharp point. The anterior edge of the plate presented three acute angular projections, which correspond with the inter-dental spaces; and from this margin also the false tooth formed a prominent projection. The extreme length of the plate—in other words, the *sector* of the circle—was an inch and five-eighths; while a line drawn from the edge of the tooth to the sector measured exactly one inch.

This plate had been swallowed by the patient during sleep, about 2 o'clock a.m.; and Mr. Martin, finding that it had stuck in the gullet, and could neither be seen nor felt from the mouth, brought him up to Mr. Cock for further advice.

There could be no doubt that the foreign body had lodged in the cervical portion of the swallow, but its exact situation was not very clearly indicated. The pain and irritation, together with tenderness on pressure, all of which were very considerable, were referred to the top of the œsophagus, just below the larynx; but no projection indicating the precise locality of the plate could be detected from the exterior. He was able to swallow fluids, although in very small quantities and with great difficulty. His breathing was not impeded, but he had an irritating laryngeal cough.

Under these circumstances, Mr Cock judged it most expedient to delay any active measures for extraction until the patient had recovered from the immediate effects of the accident and the fatigue and excitement of his journey. He was therefore advised to go into the hospital, in order that every available means might be used; and he willingly agreed to this arrangement. In the course of the afternoon he was visited by Mr. Cock, who passed a bougie into the pharynx, and found a total obstruction about the lower edge of the larynx, in fact, just at the junction of the pharynx and œsophagus. A pair of strongly-curved forceps detected the plate, but it could neither be grasped nor moved from its position. As his respiration was unimpeded, and the pain quite bearable when kept at rest, it was determined to postpone further measures until the next day. A full dose of opium was given, as much fluid nourishment as he could get down was ordered, and he was furnished with ice to suck at his leisure.

On Friday, January 18, Mr. Cock saw him, with Mr. Hilton. He was calm and tranquil, and had not suffered acutely except when pressure was made from the exterior, or when he attempted to swallow. It appeared very doubtful whether any fluid which he took into his mouth found its way into the œsophagus. Attempts were made with several instruments to grasp or dislodge the plate, but they all proved abortive, and it was found impossible to pass any instrument between the foreign body and the walls of the gullet, so as to get it below the obstruction. Mr. Cock at length succeeded in introducing a flexible catheter, No. 5, which appears to have found its way between the horns of the clasp which formed one end of the plate. As a means of conveying fluid into the stomach had now been obtained, it was suggested that the action of vomiting might possibly alter the position of the plate, and render it more accessible from the mouth. A pint of milk was accordingly conveyed into his stomach, and then half a drachm of sulphate of zinc and a scruple of powdered ipecacuanha administered. Strange to say, not even a sense of nausea was produced, and the emetics were retained without producing the slightest constitutional effects. A mode of

administering nourishment had, however, been obtained, and we could, therefore, afford to wait and take the chance of any favourable contingency. On Saturday, January 19, Mr. Cock made another attempt. Since the previous day he had twice fed the patient with milk, wine, and beef-tea ; but the catheter was passed with great difficulty, and there was only one particular spot on the left side where it could be made to penetrate into the œsophagus. He was unable to swallow a drop of fluid by natural efforts, but derived great comfort from sucking ice. Mr. Cock attempted to pass a looped wire round the plate, and also manipulated with a flexible tube, from the extremity of which a pair of forceps could be projected, but no success could be obtained, and farther proceedings were laid aside for the present. On Sunday, January 20, no attempts were made, but the patient was fed three times through the catheter ; the introduction of the instrument becoming more and more difficult each time. On Monday, January 21, Mr. Cock again met his colleagues. It was now imperative that some decisive step to remove the foreign body should be taken, as the flexible catheter could no longer be passed, and the patient was beginning to feel seriously the effects of want of nourishment and rest. The position of the plate was pretty clearly ascertained. It was impacted either at the commencement of the œsophagus or else just above (where the œsophagus and the pharynx join). It was determined to cut down and open the gullet. Mr. Hilton assisted Mr. Cock in the operation.

The patient was placed on his back, with his head and shoulders slightly elevated. Chloroform was given, and he was soon quietly under its influence. An incision of about four inches in length was carried from the upper edge of the thyroid cartilage, nearly as far down as the sterno-clavicular joint ; on the left side of which the platysma and cervical fascia were divided, bringing into view the carotid sheath and the omo-hyoideus muscle, which was thick and fleshy where it crossed the wound. This latter was divided, together with some filaments of the descendens lingualis nerve, and two or three small arteries, which were immediately tied to prevent as much

as possible infiltration of blood into the cellular tissue. A little farther dissection laid bare distinctly the common carotid artery, the inner connections of which were easily separated with the handle of the knife and the finger. It was considered to be an important object to separate completely the carotid artery from its internal attachments; and this having been accomplished, the vessel, together with the sterno-mastoid muscle was drawn outwards and retained by retractors, and thus rescued from injury or molestation, while the further steps of the operation were carried on, the object of which was to reach the upper portion of the œsophagus.

The thyroid body was now exposed by dividing a few of the external fibres of the sterno-hyoid and sterno-thyroid muscles, and the dissection was continued along the outer surface of the gland backwards towards the spine. The tissues were separated partly by the handle of the knife, partly by the blade. An artery, probably a branch of the superior thyroideal, was divided where it crossed the upper part of the wound, bled freely, and was secured with some difficulty. A larger vessel, probably the inferior thyroideal, was seen running across lower down, but escaped without injury. The larynx and trachea were gently drawn over towards the right side, so as to widen the large wound which gaped along the side of the neck.

The œsophagus was reached by following round the surface of the thyroid body, which completely covered and concealed the trachea.

About two inches of the gullet could now be traced with the finger, but no projection indicating the presence of the foreign body could be felt. It therefore seemed tolerably certain that the plate had not descended into the œsophagus, and must be lodged in the lower part of the pharynx. With some difficulty, by tilting the larynx a little forwards and over to the left, the finger was passed behind it, that is, between the pharynx and the vertebræ, and the body was now obscurely felt exactly behind the cricoid cartilage, protected as it were by the inferior course of the thyroid. The point of the knife was now brought to bear on what appeared to be the most prominent part, which proved to be the single tooth, and the grating sensation

of the blade indicated that the pharynx was opened, and the foreign body reached.

The white tooth, in fact, became visible at the bottom of the wound; and, being grasped with a pair of forceps, the opening into the pharynx was dilated upwards and downwards with a blunt-pointed bistoury. After a little manipulation, one end of the plate was disentangled from its attachments and brought out of the wound, but the entire body was not extricated until a further slight division of the walls of the pharynx had been made. This, however, was soon accomplished with the assistance of Mr. Hilton, who cut along the edge of the gold plate, while Mr. Cock gently withdrew it with one hand, and protected the parts with the fingers of the other. The patient was carried to bed, and cold water applied to the wound, no means being used to bring the edges together. On recovering from the effects of the chloroform, he seemed to have suffered but little from the operation, expressed himself as comfortable and free from pain, and returned eagerly to his former occupation of sucking ice. An enema of beef-tea and wine was thrown up, as he had had no nourishment since the previous day. In the evening, he complained of great exhaustion, or rather sense of starvation, and Mr. Cock gave him nourishment through the catheter, and a full dose of opium.

January 22.—Was free from all untoward symptoms, and only complaining of an empty stomach. He was fed with milk and beef-tea three times. Sucking ice was a great luxury, although he believed that none of it passed into the œsophagus, and, as far as could be ascertained, no water found its way out by the wound. On the third day, January 24, Mr. Cock introduced the common œsophagus feeding-tube, which passed readily, without pain or obstruction. He has since been regularly fed by his dresser, Mr. Dyer, at first, three times, but afterwards, at his own request, four times in the twenty-four hours. He is always ready, indeed eager, for his meals, and receives them with great enjoyment. His diet consisted of beef-tea, brandy, and egg, arrowroot, with milk or wine. Notwithstanding this nourishment, of which he swallowed

about four pints in the twenty-four hours, he was evidently losing flesh and strength. Accordingly, Mr. Cock ordered as much pounded meat to be mixed with the beef-tea as could be made to pass through the tube, and directed an ounce to an ounce and a-half of cod-liver oil to be given at each meal. He takes an opiate every night, but the quantity is undergoing gradual diminution.

February 5.—The increase of nutriment, or the oil, or both, have produced a decided improvement in his appearance, and he expresses himself as feeling stronger and better. His spirits have all along been good and hopeful.

The wound has looked healthy from the first, and has now contracted to half its original size. Since the operation nothing has been swallowed by natural deglutition, and he is very unwilling to make the attempt, as it causes considerable pain, and a sensation as if the wound was being rent open. He does not appear to swallow his saliva.

Had the foreign body been lodged in the upper part of the œsophagus, its extraction would probably have been more easily accomplished; but the protection which was afforded by the cricoid cartilage in front, and the posterior edge and inferior course of the thyroid, which, as it were, overlapped it at the side, rendered the access to it difficult and tedious, and materially complicated the operation.

Recovery in this case has since been reported. The wound wholly closed, and in about a month the man was able to swallow well. For the first three weeks all the nutriment taken was conveyed into the stomach by instrumental aid, but by the end of that time the wound had closed.

Mr. Cock has also recorded, in "Guy's Hospital Reports," a second case in which he had to perform the operation of pharyngotomy.

## CASE II.

*Silver Tooth-plate impacted in the Pharynx. Operation and Recovery.*

Mr. Cock's Case ("Guy's Hospital Reports," vol. xiii., 3rd series).

A man was in the habit of wearing a silver plate on which seven teeth had been formerly fastened, but though the teeth had fallen away he continued to wear the plate. One night he woke up choking, the plate having slipped into the pharynx while he was asleep. Attempts were made unsuccessfully to remove it through the mouth. The patient at length objected to further interference, and placed himself under the care of Mr. Cock. The breathing was then unaffected, nor was there any constitutional disturbance, nor any other symptoms than that of a little local inconvenience, aggravated by attempts to swallow. He had taken no food for 70 hours, for whenever he attempted to swallow anything solid or liquid it returned.

A large flexible catheter was passed by the side of the plate down the œsophagus, and through it the patient was fed. Mr. Cock, finding there was no prospect of moving the plate without opening the pharynx, operated upon the man four days after the mass had been swallowed. The plate was removed successfully. The mass consisted merely of the metallic portion of the artificial structure, but had projecting from its edges six points or sharp wires, upon each of which a tooth had been formerly fixed, and also from the end there projected two sharp arms, which had embraced a tooth or stump. Like the first case related by Mr. Cock, its shape rather than its size interfered with its passage down the œsophagus. It measured one inch and eleven-sixteenths in its largest diameter.

Cases in which similar operations have been performed (although of rare occurrence) have been recorded, usually after swallowing pieces of

bone, but although the operation appears to have been successfully accomplished, death has in most instances followed in from one to three days. The dangers attendant upon the operation of œsophagotomy appear to be, 1st. hæmorrhage during its performance; 2nd. sloughing of the wound; and 3rd. subsequent visceral inflammation. But it must be borne in mind that the two latter results are more likely to occur if the impacted body be allowed to remain, than from the operation. Abscess and sloughing attendant upon delay point to the necessity of early operating, if the good results obtained by Mr. Cock are to be taken as any guide.

## CASE III.

*Extraordinary Case of Foreign Body in the Larynx.*

(From the *British Medical Journal*, June 5th, 1875.)

There are numerous instances on record of foreign bodies, such as coins, rings, fruit-stones, &c., becoming impacted in the larynx without causing any very urgent symptoms; but the following case, related by Dr. Leopold Schrötter, in his lately published *Report of the Clinic for Laryngoscopy at the Vienna University* (1875), is most extraordinary. It seems almost incredible that during sleep, when respiration is quiet and the glottis is not open to its fullest extent, a sober man could unconsciously get into his larynx a foreign body exceeding, in all its diameters, the dimensions of a glottis opened as widely as possible. A very intelligent man noticed at breakfast that his false teeth (four upper incisors attached to a gold plate) were missing. When he began to search for them, he felt, for the first time, some obstruction in the throat and some

difficulty in breathing, and then concluded that he must have swallowed the teeth during the night. He had taken on the previous evening only a light meal, without much alcohol. Dr. Schrötter saw the patient the same day; he then spoke without difficulty, but complained of pain in the lower part of the throat. Laryngoscopic manipulation was difficult, and a superficial examination showed nothing abnormal. The foreign body was therefore supposed to be in the œsophagus; and, on passing a probang, resistance was experienced in the upper third, but nothing could be brought up. This failure, and the increasing dyspnœa of the patient, led Dr. Schrötter to make a very careful examination of the larynx; and, after several trials, a foreign body was seen under the vocal cords, and soon the plate and two teeth were made out with certainty. Dr. Czerny (then Billroth's assistant, now Professor at Freiburg,) was then called in, to assist in laryngotomy. On examination, he also could find nothing abnormal in the larynx, but met with the same resistance in the œsophagus; his attempts at extraction were, however, as unsuccessful as Dr. Schrötter's had been. The latter now urged immediate laryngotomy, but Czerny thought that, as Schrötter saw the foreign body so clearly, he might first attempt its removal through the mouth by the aid of the laryngoscope—an operation which he had successfully performed in other cases. Although not expecting much from such an attempt, less on account of the anatomical difficulties than because the foreign body was turned with a smooth surface upwards and offered little hold for the forceps, Dr. Schrötter consented to make the trial; and, as he had other business, and the patient was somewhat easier, he appointed 5 P.M. for the operation. However, when he returned at that hour, he found that the dyspnœa had increased so rapidly during his absence, that Dr. Czerny had been hastily summoned about three o'clock, and had been obliged to perform laryngotomy at once, the patient's breathing being suspended during the operation. On dividing the crico-thyroid membrane, the point of the bistoury struck the artificial teeth; an attempt was made to remove the foreign body through the wound by means of forceps, but, not succeeding in this, Dr.

Czerny forced it up through the glottis, and removed it through the mouth. The patient wore a tube for thirteen days, but made a good recovery. When he was quite well, Dr. Schrötter again passed a probang, in order to ascertain, if possible, what had deceived both himself and Czerny in regard to the condition of the œsophagus. He met with the same obstruction, and concluded that, as the patient was of a decidedly rachitic build, it was probably due to a prominent vertebra.

The artificial teeth measured $\frac{3}{4}$ of an inch by $1\frac{1}{4}$.

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## Class III.—Cases where Artificial Teeth have been Swallowed and Passed by the Patient, or Ejected.

### CASE I.

*Foreign Body in the Œsophagus.*

Mr. John Windor's Case. (*Medical Times and Gazette*, Feb. 23rd, 1856.)

On May 2, 1855, I was consulted by Mrs. D., aged 30, who stated that, during the preceding night, in her sleep, she had accidentally swallowed a piece of plate, containing three artificial teeth, corresponding to the outer incisor, the canine, and first bicuspid. The accident appeared to have been occasioned by this piece having been affixed to a faulty tooth, and thus being too easily detached.

Notwithstanding the inconvenience and suffering thus produced, she had walked to my house, in order, if possible, to get the substance removed. It had passed too far down either to be seen or to be felt by the finger. She referred the sensation produced to a point behind the upper part of the sternum.

On having recourse to the probang, I manipulated very gently with it, and, after a little time, succeeded in passing it down the œsophagus, hoping that it had carried the extraneous body before it into the stomach, especially as she thought herself much relieved. I prescribed for her a little soothing and aperient medicine.

On the following morning she came to me again, stating that she still felt as if there was some obstruction in the part. On having again recourse to the probang, I met with resistance near the upper part of the œsophagus, but, after a short time, it again passed, inducing us to hope that the obstruction was now removed.

On visiting her at her own residence, two days afterwards, she stated that, from her own sensations, she believed the substance had not really descended into the stomach until the following night after she had called upon me the second time, and on the succeeding day it was discharged through the bowels.

On examining the plate, I found the teeth had not been attached to gold, but to an inferior metal, to lessen expense, I suppose.

Except a little soreness in swallowing for a few days, she suffered, I believe, no further inconvenience.

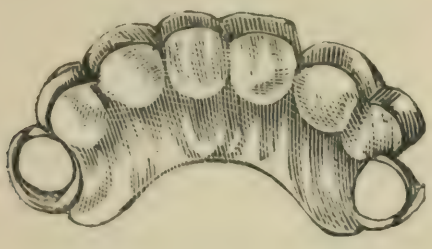
## CASE II.

*Piece of Six Artificial Teeth on Gold Plate Swallowed and Passed.*

Mr. Theophilus Taylor's Case. (*Lancet*, April 3rd, 1869.)

Mr. George Pollock in bringing forward this case remarks, "that when once a foreign body is introduced into the pharynx, its *shape* is, to some extent, of more importance than its *size*. Its

easy and safe progress onwards through the alimentary canal will greatly depend on the former.



The extreme diameter of this plate is $1\frac{3}{4}$ inch. It will be observed that it has no sharp or projecting points; its entire margin is comparatively smooth.

"I was called to see Mrs.——between two and three o'clock p.m., on February 25th, and was told by her husband that, while taking some soup a few minutes before, she had swallowed her set of artificial teeth, consisting of six teeth set in a gold plate for the upper jaw. She complained of a burning sensation at the epigastric region, but of no other distress; and she could then swallow easily. I advised her to take castor oil, and to live on farinaceous diet.

"I saw her the next day, when she expressed herself as 'quite comfortable, and not at all inconvenienced.' The bowels acted freely from the oil that day and the next. On the morning of Feb. 28th, at 8 a.m., she had a 'bearing-down' feeling in the rectum and urgent desire to go to stool, and presently the teeth passed, as complete as they had been swallowed three days before. The mass was enveloped in thick mucus when first examined. The patient is perfectly well, and has not had any unfavourable symptoms since."

## CASE III.

*Four Artificial Teeth on Gold Plate Swallowed, and extracted through the Rectum with Instruments.*

Dr. Julius's Case, communicated by Mr. Thos. H. Harding. (*Lancet* April, 1860.)

Mrs.—— swallowed a gold plate, on which were four teeth fixed with clasps at each end of the plate. One of the clasps had become bent, and formed a sharp point. Some hours afterwards she complained of severe pain in the stomach, which seemed very much extended. After a lapse of some hours the pain suddenly left her. Felt nothing more until about twenty-four hours afterwards, when she suffered severe pain in the caput coli, which continued for some hours, and then passed off in a similar manner.

The next morning Dr. Julius was hurriedly sent for, and on arriving found her in great agony, with a constant desire to pass urine, and relieve the bowels. Upon passing a catheter into the rectum, he distinctly felt a hard metallic substance firmly fixed across the bowel, about two inches from the sphincter. He now introduced a three-bladed speculum, and dilated the bowel as much as could be borne, and with the aid of two pairs of forceps he brought down the sharp end of the plate, and then extracted it entire, with very slight injury to the mucous membrane. In a few days she was quite well.

The teeth swallowed were two central, and two lateral incisors, with the clasp extending to the first molar.

## CASE IV.

*Two Artificial Teeth on Gold Plate, Nineteen Days in the Œsophagus, and afterwards for Ninety-seven Days in the Stomach.*

Mr. J. Blackstone's Case. Communicated to the *Lancet*, April 3rd, 1869, by Mr. George Pollock.

I have already recorded this case,* but as the additional particulars now communicated are not only very interesting but also instructive, I have thought it better to include it in this summary.

Mrs. T., æt. about 33, while attempting to swallow some pills, dislodged her artificial teeth, fixed to a small gold plate. The teeth consisted merely of the two central incisors. The mass dropped into the pharynx as soon as it became dislodged. The patient almost immediately felt pain "down the throat," and shortly afterwards, on attempting to take food, experienced difficulty in swallowing it; the greater portion of it returned almost as soon as swallowed. It was evident that the rejected food had not passed into the stomach. The pain was referred to the median line, rather low down in the chest, and to a point above the epigastrium; it was fixed and persistent, sometimes sharp, and always increased on any attempt to take solid food or fluid.

She was very soon seen by Mr. J. Blackstone, of Gloucester-place, Regent's-park, who prudently watched the case for some days; nor did he make any attempt to interfere with instruments, as the plate was evidently out of the reach of forceps. Finding, however, that the pain continued, and that there was not only difficulty in taking nourishment, but that it was

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* "Trans. Odontological Society," vol. ix. page 43.

chiefly obliged to be taken in a fluid form, and always with great aggravation of pain, he requested me to see the patient. This was on the tenth day after the accident. There was still much discomfort, and an inability to swallow food without pain: it could only be taken in small quantities, and that chiefly in the fluid form. The pain was described to be low down in the median line, and referred to a spot corresponding to the lower extremity of the œsophagus.

At our request the patient made an attempt to swallow a little fluid in our presence, when it became quite evident that some positive partial obstruction existed in the œsophagus. The fluid was taken with caution, in small quantities, and slowly, otherwise a sensation of choking was produced; nor did the small quantity pass into the stomach as freely as it should have done.

No attempt was made on this occasion to pass any instrument. As the pain was referred to so low a position, it was considered just possible that, as the foreign body was probably far down, solid food persistently taken might propel the mass into the stomach. The patient was therefore recommended to try the effect of swallowing large pellets of well-masticated bread; with the hope that, if the œsophagus could thus be slightly distended, the foreign body might be pushed into the stomach by the food. Another reason for avoiding instrumental interference was, that the plate was described to be rough at its edges, with one or two sharp points projecting therefrom. It was considered that, with such a mass, fixed by sharp points to the walls of the œsophagus, forcible attempts to push it onwards might probably be followed by serious mischief. It was therefore decided to wait a few days longer, with rather a forlorn hope that some favourable change in the position of the foreign body might take place; all aperient medicine to be avoided in the mean time.

On the 4th of January the local symptoms were unchanged, but the patient was evidently thinner and weaker, for she had not been able to take much solid food since the day of the accident. She was also very anxious about herself, and was becoming very nervous and desponding. An œsophagus-tube

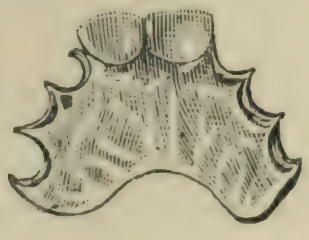
was now passed very slowly and gently through the mouth and pharynx into the œsophagus ; when more than halfway down, and near the cardiac orifice, the extremity of the instrument came in contact with some solid resisting body. With very slight continued pressure the latter appeared to be almost immediately dislodged, and the end of the tube then readily passed into the stomach ; nor was anything felt to rub against it or resist it on its withdrawal. The patient immediately expressed herself relieved from the pain, and was now able to swallow solids and liquids without difficulty.

In a few days, however, this lady again began to complain of pain, but it was now at a different spot. The pain was referred more to the right side, and somewhat lower than before —apparently about the neighbourhood of the pyloric extremity of the stomach.

This new symptom persisted more or less without relief, and without alteration of position ; but the patient was able to take food, and she generally improved in condition. The treatment laid down was, to avoid aperient medicine, and to attend generally to the state of the health.

Thus the patient continued, without any perceptible alteration, until the 11th of April. On that day she had been ordered to take two pills. While in the act of swallowing them she vomited, and brought up a quantity of fluid from the stomach. In the act of vomiting she heard something strike against the basin, and on more carefully examining the contents, found, to her great delight, that she had brought up the artificial teeth and plate, as perfect and as bright in condition as on the day the mass had been swallowed.

This foreign body was nineteen days in the œsophagus, was then dislodged, and remained ninety-seven days in the stomach.



The Artificial Teeth, of which the engraving, page 165, is an accurate representation, were exhibited to the Odontological Society at the Meeting in December last.

## CASE V.

*Two Artificial Teeth on Plate Swallowed, and Passed by Patient. Treatment.*

Communicated to the "Medico-Chirurgical Society of Edinburgh" by Mr. Joseph Bell.

Two teeth with plate attached had been swallowed by their wearer, a young woman. Mr. Bell was suddenly called out to attend her, as she was supposed to be dying from suffocation. On reaching the house, however, he found that the spasm had passed off. On making inquiry, he found out that her false teeth had become loose, but yet she had foolishly neglected to take them out upon going to bed.

By passing a probang into the stomach he hit upon a hard body, which he had no doubt was the teeth. Notwithstanding Mr. Little's success (see Case III., Class I.) in directly extracting them from the stomach, he did not try to do so, more especially as the gold plate was sharp-edged. He therefore ordered the patient to keep in her bed, and take as *indigestible* a diet as possible, consisting of cheese, porridge, suet dumpling, stewed apples, &c., along with opium occasionally. By this means large solid stools were produced, in one of which the teeth had been passed by the patient, notwithstanding the size and jagged outline of plate, without any pain or damage to the alimentary tract.

## CASE VI.

*Plate with Artificial Teeth Swallowed and Passed by the Patient. Novel Treatment.*

Communicated to the "Medico-Chirurgical Society of Edinburgh" by Dr. Dickson, Feb. 2nd, 1876.

Mrs. L. called about 6 o'clock a.m. on Christmas day last, stating that she had, while asleep, swallowed her artificial

teeth. On passing a taper-pointed bougie, an obstruction was encountered at about the level of the middle of the sternum. Emesis was tried, but unsuccessfully. An expanding hair probang was then used, with the result of pushing the obstructing material into the stomach. She was then told to go home and cut up a quantity of *sewing threads* into finger-lengths and swallow it in thick porridge. She was also ordered to eat plenty of figs and raisins, and *not to take* any purgative medicine.

This treatment was continued for eight days. Each morning she felt a gnawing pain at the pit of the stomach, which was always relieved by food. On the 1st of January the pain began to shift, and on the forenoon of the 2nd she felt a severe cutting pain at the anus while at stool, when she found that she had passed the teeth wrapped up in the threads.

She had been asked, in the event of her passing the teeth, not to clean them in any way till examined, but before my arrival she unfortunately had washed them, leaving only a few of the threads adhering. The hollows were filled with a substance like figs.

The set consisted of a gold plate $1\frac{3}{4}$ inch wide by 1 inch deep, and measured $2\frac{1}{2}$ inches round the front, with hooks at each side for fastening to the natural teeth. My reason for using the thread was, that having seen hawks "cast" up the bones of mice neatly wrapped in the fur, I thought that in a similar way the peristaltic action of the stomach and bowels might envelop in indigestible fibrous matter such things as pins, bones, teeth, &c., inadvertently swallowed. I tried the plan with good results some time ago in a case of pin-swallowing. Cotton, tow, or similar substances, might suit even better than thread.

## CASE VII.

*Two Teeth, on Gold Plate, Swallowed and Passed without pain or difficulty.*

Communicated by Mr. W. R. Wood. L.D.S.

The gold plate was $1\frac{1}{2}$ inch in length, and a little less than $\frac{1}{2}$ inch in width. It had two sharp clasps, one at each end, and had fixed on it two insulated mineral teeth. The lady swal-

lowed the piece without at the moment being aware that she had done so. It took twenty-two days in passing through the alimentary canal, and its passage was not attended with any inconvenience or pain; indeed, the lady seemed to regard it quite as an ordinary occurrence.

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## Class IV.—Where Artificial Teeth have been Swallowed and Forced into the Stomach; and Cases where Death has ensued.

### CASE I.

*A Tooth-plate fixed in the Pharynx, producing entire Closure of the Glottis.*

Communicated by Mr. George Pollock to the *Lancet*, April 3rd, 1869.

W. M.——, aged twenty-four, was brought in dead to St. George's Hospital on August 16th, 1862. He was stated to have been running, when he stumbled and fell to the ground. As he did not rise, he was supposed to be in a fit, and was conveyed to the hospital. When admitted he was quite dead. The cause of death was unsuspected.

On *post mortem* examination, the lungs were found congested, but all the other viscera healthy. When the finger was passed into the pharynx, in order to take out the adjoining structures, an irregular hard mass was felt lying upon the epiglottis. This proved to be three false teeth, fixed upon a metal plate, having a sharp, prominent hook at each end to grasp some teeth in the upper jaw. The false teeth lay in the pharynx, but were loose and unattached in that position. There was no mark of injury upon the surrounding mucous membrane.

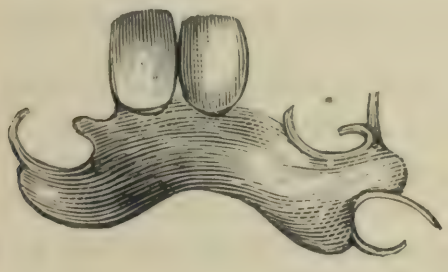
No measurement is preserved of this plate, as the friends of the man would not allow it to be left at the hospital. There can be no doubt that, in this case, the plate became dislodged fixed by its sharp points in the pharynx, and, pressing on the glottis, produced immediate suffocation.

## CASE II.

*Artificial Teeth Swallowed, Dislodged, and ultimately Passed by the Patient.*

Mr. Henry Smith's Case. (*Lancet*, April 1st, 1871.)

On the night of November 30th, 1870, I was summoned to Mitcham by Dr. Hamilton, who had the wisdom to telegraph the nature of the accident; and I thus went down with suitable instruments. I found a corpulent butcher in great distress, he having six hours previously, by some means or other, allowed his false teeth, with their plate, armed, as is seen, with most formidable hooks on either side, to slip down his throat.



He at once sent for Dr. Hamilton, who, on passing his finger down into the pharynx, could distinctly feel the foreign body on the right side; but, unfortunately, he had not the requisite instruments, and in his endeavours to dislodge it, the body got out of his reach.

On my arrival, the patient pointed to just above the clavicle on the right side as the spot where the intruder lay. I at once passed a long pair of crane-bill œsophagus forceps, and imagined that I could feel the foreign body, but I could not catch it. I tried carefully again and again with other instruments; but, as considerable bleeding ensued, and as there was great distress on the part of the patient, I determined to push the body down into the stomach, and with that view passed a full-sized œsophagus bougie into the stomach, when the sensation of the presence of the tooth-plate at once ceased.

The patient was ordered to keep perfectly quiet, and to take plenty of gruel porridge and oil. He had no pain at all, except for about five hours on the day the foreign body passed away, which event happened nine days after I had pushed it down. The patient has suffered nothing since.

Dr. King narrated before the Medical Society of London, on the 16th January, 1871, a case where a man swallowed his false teeth. He was seen by him at the Edinburgh Infirmary. Mr. Syme not being able to pull the teeth up, at once pushed them down. A few days after Dr. King was sent for to see the man, and found him dead. The angular hooks on the tooth-plate had torn the œsophagus, and perforated the aorta. In the stomach was a complete cast of its cavity in blood clot.

The course of treatment to be adopted in cases where artificial teeth have got into the pharynx or passed into the stomach, whether unaided or by the use of an instrument, has already been dwelt upon while narrating the cases quoted, but a few remarks may yet be profitably appended.

Mr. Henry Smith has observed that it is a dangerous practice to force the swallowed teeth into the stomach. He continues: "I know of two instances where death followed this plan of treatment, one of them from hæmorrhage; but I am not sure that prolonged and forcible attempts to extract such a formidable-looking body would

not be attended with as much danger; and there are so many instances on record where such ugly bodies have passed through the intestinal tract with safety, that the surgeon is quite justified in resorting to the expedient I adopted, providing he has first made an effort to extract the substance. The attempts I made were quite sufficient to tell me that I should not succeed in extracting the false teeth; and, indeed, I necessarily put the patient to so much pain and distress, and brought about so much bleeding, that I was only too glad to desist from further attempts. If these attempts do not succeed at once, they are not likely to succeed at all."

Mr. Thomas Smith writes to me: "In all cases I have had to do with, or been consulted about, I have either used or advised pharyngeal forceps with a gradual curve (not rectangular), with deeply serrated ends, so as to hold firmly; and if the foreign body could not be grasped with the forceps having blades expanding laterally, I have used those with blades expanding in an antero-posterior direction.

Mr. George Pollock, who has given considerable attention to this subject, writes to the *Lancet*, April, 1869:—

"The stomach was removed from a dead body with the duodenum attached, and the cardiac half was cut off. The pyloric half was then held up and opened, the pyloric orifice and duodenum being dependent. A half-crown piece was

dropped into this portion of the stomach ; with a little shaking it passed through the pylorus and dropped out through the duodenum into a basin below. The artificial tooth-plate (Class III., Case IV.) was then dropped into the same portion of the stomach, held up in a similar manner. With very little shaking it soon slipped also through the pyloric orifice and duodenum. Another plate with artificial teeth was then dropped into the suspended portion of the stomach. The prominent tooth at once fell into the pyloric orifice, but the points at the extremity of the tooth-plate hooked into the sides of the valve, and no shaking or manipulation, *without force*, could have succeeded in getting it through the orifice and duodenum ; the sharp projecting points alone stopped the progress from the stomach into the duodenum, and from the ileum into the caput coli.

"The plate (Class III., Case II.) is larger than either of those referred to by Mr. Cock, but the results of the cases are materially different. The smooth-edged plate, but the largest, passed through the whole alimentary canal without any great inconvenience to the patient in three days, while the other two, with sharp projecting points, were at once impacted in the pharynx, and could only be removed through an external opening.

"It thus appears, that even a small tooth-plate with sharp points or rough edges is not likely to pass beyond the stomach, even should it get so far, while a larger one with smooth edges may pass through the alimentary canal without much discomfort. A large plate with sharp points at its edges cannot pass beyond the pharynx, and when once there, cannot readily be removed without the pharynx is opened externally ; but a large plate with smooth edges having passed into the pharynx, though it cannot get beyond that point, may be withdrawn through the mouth, and does not necessarily involve a very serious operation.

"Mr. Cock observes, 'As the use and application of artificial teeth daily increases, and as many of them are imperfectly fitted and carelessly worn, there can be no doubt that this casualty will occur again and again.'

"If the foreign body be lodged in the pharynx, and there

be sharp points projecting at the edge, no effort on the part of the surgeon will succeed in pushing it downwards, nor should any such attempt be thought of. It is either retained there by its size, as in Sir James Paget's case, or by its shape and sharp points, as in the cases recorded by Mr. Cock. When satisfied that the mass is in the pharynx, the surgeon should attempt first to remove it through the mouth; but if these attempts fail after a few trials, they should not be persevered in. Violent and oft-repeated trials to extract it will only be followed by local irritation, and might even produce more serious mischief. When, therefore, gentle means have failed to relieve the pharynx of the foreign body, œsophagotomy should be had recourse to without delay. As regards general treatment, I am of opinion that we cannot be too particular in abstaining from aperient medicine: the more solid the contents of the stomach the greater will be the facility in passing, especially when once in the lower bowel; whereas if the contents of the bowels be entirely liquid, the foreign body may become more or less impeded in its exit by the walls of the bowel contracting on it.

"Practical experience has established this kind of treatment as a rule amongst those who make their living by passing false coin. When detected, they swallow whatever bad money they may have about them, and if they escape they live on constipating diet until the coin has passed."

Mr. Carter, before the Medical Society of London, related a case where a brooch was swallowed. The patient was made to eat a large quantity of bread, and then an emetic was given, when the bread and the brooch all returned together; but by far the most valuable suggestion that has yet been offered where foreign bodies have got into the stomach, is that devised by Dr. Dickson, and recorded in this summary at

Case VI., Class III. He recommends that cut-up thread, worsted, tow, or similar substances, should be mixed with the food, the diet being made as constipating as possible. I am happy in being able to state that Mr. Joseph Bell, of Edinburgh, has kindly written to inform me that in two cases he has met with, besides that related, (Case V., Class III.), where teeth have been swallowed, this constipating diet and the mixture of porridgeand thread have proved most successful, the foreign body having been passed in from six to twelve days without any unpleasant symptoms ensuing; and we can arrive at no other conclusion but that the practice formerly adopted of administering purgatives is the most dangerous that could well be devised, and calculated, if the artificial teeth or other foreign bodies have any clasps or sharp projections, to lacerate the alimentary tract.

In conclusion, allow me to take this opportunity of thanking those gentlemen—members of the medical profession—who have so materially assisted me with new cases, and suggested treatment. I also hope that I may be permitted in the name of the Odontological Society to say how much we are indebted to the medical journals, not only for their published cases, but also for the use of the illustration blocks, without which some of these cases would lose so considerably in interest.

*Death from Swallowing Artificial Teeth.*

(Copied from *The Daily News*, Monday, 19th March, 1877.)

An inquest was held by the Liverpool coroner on Saturday, on the body of a middle-aged woman, named Maria Shuker, a domestic servant, of Wrexham. About a month ago she went to the Liverpool Royal Infirmary, having swallowed a set of false teeth in her sleep, owing to the plate breaking. The teeth had lodged in her throat, and were removed by an operation; but an abscess having formed, she died on Friday last. The jury returned a verdict accordingly.

[*Ed.* Trans. O.S.]

## Discussion.

The President said that the Society was greatly indebted to Mr. Weiss for the trouble he had taken in collecting these very interesting and instructive cases, and for the skilful way in which he had classified and arranged them. He highly commended the valuable hints on treatment which the paper contained. He quite agreed with Mr. Weiss that these cases were by no means rare, and he had no doubt that many of the members present would be able to supplement Mr. Weiss's examples by others which had come under their own personal observation.

Mr. J. S. Turner thought that all would agree with the very sensible remarks on treatment which Mr. Weiss had given them. He would remind Mr. Weiss of a remarkable case which had come under his (Mr. Turner's) care at the Middlesex Hospital, and which was published in the Society's Transactions a few years back. A commercial traveller had a lower plate without teeth, impacted under his tongue for twelve months. When he came under Mr. Turner's care, the patient was very weak and emaciated, had almost lost his voice, and his breath was dreadfully fœtid. The plate had ulcerated into the genio-hyo-glossal muscles, and lay imbedded in and concealed by the inflamed and swollen tissues. The disease had been supposed to be cancerous, but Mr. Turner fortunately discovered the real cause of the mischief, and, with some little trouble, dissected it out. The patient quickly recovered his strength.

Mr. Charles Tomes said that a patient once came to him to show a plate which she had swallowed; it measured 2 in. by $1\frac{1}{2}$ in., but had been passed per anum in the course of a fortnight or three weeks, without having caused any pain or inconvenience. A constipating diet had been ordered in that case.

Mr. Sewill wished to call attention to the harm which might be done by too forcible attempts at extraction, especially if there should happen to be any sharp hooks or wires attached to the plate. A girl had lately died in St. Mary's Hospital with enormous general emphysema, the result of a slight laceration of the œsophagus.

Dr. Langmore added a few remarks to the case which had been recorded by Dr. Leopold Schrötten in the Report of the Clinic for Laryngoscopy at the Vienna University, and of which an abstract appeared in the *British Medical Journal* for June 5th, 1875.* The patient, who was said to be sober and intelligent, got into his larynx, unconsciously, during sleep, an upper plate with four incisor teeth attached; this remained impacted in the larynx for some twelve hours, and actually caused so little inconvenience to the patient that it was for some time doubtful whether the foreign body was in the larynx or in the œsophagus.

Mr. Hutchinson asked Mr. Weiss how many cases he had met with in which teeth had been drawn into the larynx; he believed it was a rare accident. He thought the probable explanation was that the plate in most cases fell on, or touched the back, of the tongue, that the involuntary muscles of deglutition were thus called into action, and the teeth were, in this way, passed safely over the epiglottis and the opening of the larynx.

Mr. Ashley Barrett said he should be glad if Mr. Weiss would, in his reply, state somewhat more fully what treatment he would recommend in the different classes of cases which he had described. For instance, when the teeth had passed into the stomach, would he rely entirely on diet, or did he think any drugs would be useful?

Mr. Dennant said that some twenty-five years ago he had removed a small plate with two teeth, upper canine and first bicuspid, from the œsophagus; it was rather firmly impacted,

* See Case III. Class II. of Mr. Weiss's Cases.

but came up with a little pulling, and no harm resulted. He should like to know how far these accidents were due to what might be called "empirical" dentistry? Were they not mostly hospital cases? At all events they should deduce one practical conclusion from the long list of cases which had been brought forward, viz., that since the swallowing of plates had been shown to be not uncommon, they should keep the possible occurrence of such an accident always in mind, and so adapt their work that the accident, if it did occur, might be less likely to have a serious result. Wires and clasps round teeth should be avoided; they were unnecessary, for the clasps might be shaped as cheek plates, or at least made tolerably broad and rounded at the extremity, so as not to present the sharp points and hooks which had proved so dangerous in some of Mr. Weiss's cases.

Mr. Woodhouse said he had met with two cases. The first was that of a gentleman of a very excitable or impulsive disposition, who, before dressing for a party, placed his teeth in a tumbler of water on his dressing-table. After dressing in a great hurry he felt thirsty, and seizing the tumbler, drank down its contents, teeth and all, at a draught; nor did he notice what he had done till he began to search for his teeth, and then felt some discomfort in the region of the stomach. His medical attendant administered an aperient, and in two or three days the teeth reappeared; they were three lower incisors on a gold plate, which was fastened by a broad band to the bicuspids.

In the second instance the patient was a poor girl, and the plate was larger; a constipating diet was given, and the teeth were passed after ten days. In neither case did the patient suffer much inconvenience from the accident.

Mr. Walker had met with one case. A nurse girl swallowed four teeth on a plate, but they were passed without trouble in four days. He also deprecated the use of much force in making attempts at extraction, having regard to the proximity of the large arteries to the pharynx, and the possibility of dangerous hæmorrhage.

Mr. Coleman drew attention to a manx which would often be found useful in extracting foreign bodies from the throat, either by means of forceps or a probang. When the impacted object was first seized, instead of at once pulling upwards it would be found better to press down a little first and then pull; the object might often be thus disengaged from its attachments, and would come up easily.

The President remarked that the accidents which had been discussed were more often due to the carelessness of patients than to original defects in the work. He referred to a lady of rank, now deceased, who used to be notorious for dropping her teeth into her plate at dinner; the plate was taken away and the teeth presently brought back and quietly replaced; indeed, from his experience of the way in which patients persisted in wearing teeth which had long ceased to fit properly, he only wondered that accidents were not more common. He then called upon Mr. Weiss for his reply.

Mr. Weiss said that he had not attempted to draw up a catalogue of all the cases of teeth swallowing which were on record, or he might easily have added very largely to the number. He had rather chosen cases which were instructive, and had tried to collect those, the particulars of which differed as much as possible. Nor had he added much in the way of original observations. Members could readily draw their own conclusions as to what it was best to do or avoid, from a careful perusal of the cases. They were indebted to members of the medical profession for the notes of most of the cases he had given, and on them would generally fall the responsibility of the treatment. He thought that aperients should be avoided, and that a diet should be recommended such as would give a bulky residue in which the plate might be enveloped and pass along the intestines with less danger of injuring their walls. The only novel suggestion was the administration of fibrous material, such as cut thread, tow, &c.; this treatment had been very successful in the two or three cases in which it had been tried. He did not think any drugs would be beneficial except opium.

The case of the policeman at St. George's Hospital and the one to which Dr. Langmore had alluded were the only two he had met with in which the teeth had passed into the larynx; the first, as we have said, terminated fatally; the second, after an operation, recovered.

He could assure Mr. Dennant that the luxury of swallowing gold plates was not by any means confined to the poor. Of the patients whose cases he had read, one was the daughter of a countess, and several were people of good position. Nor could these accidents be always ascribed to bad workmanship, but much more often to the carelessness, or rather recklessness, of patients. People frequently came to him wearing plates which they had had many years, and which, from the loss of supporting teeth, and from changes which had taken place in the shape of the mouth, had become loose and quite unsafe. Yet when remonstrated with they often answered that they were used to the teeth, and did not care to have them altered. One could not do more than warn such people of the risks they ran.

The PRESIDENT said that he had already expressed his appreciation of Mr. Weiss's paper, and he judged, from the discussion which had taken place, that the members present agreed with what he had said. He was sure that he might express to Mr. Weiss the cordial thanks of the Society for his interesting paper.

This being voted unanimously, the President added that, as the time had nearly expired, the discussion on the "Radical Cure of Alveolar Abscess" would be postponed until the next Meeting, when also Mr. Ashley Barrett would read a paper on "The Best Means of Excluding the Saliva during Operations in the Mouth."

The Meeting then adjourned to Monday, the 9th of April (the second Monday in the month, the 2nd of April falling on a Bank Holiday).—*Vide* BYE-LAW.

# GENERAL MONTHLY MEETING,

*April 9th*, 1877.

ALFRED WOODHOUSE, Esq., Vice-President, in the Chair.

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The Minutes of the previous Meeting were read and confirmed.

The following gentlemen were nominated for membership :—

Mr. William Taylor Smith, L.D.S., 9, Great Marlborough-street, London, Resident.

Mr. Frank R. Merson, South Molton, Devon, Non-Resident.

Mr. William McOwen, 15, Richmond-terrace, Blackburn, Non-Resident.

Mr. Arthur G. Payne, 2, Sussex-place, Southampton, Non-Resident.

Mr. Harcourt A. B. Bevers, L.D.S., 46, Broad-street, Oxford, Non-Resident.

The following gentlemen were elected members of the Society :—

Mr. Milward Harding, 19, Park-square, Regent's-park, London, Resident.

Mr. George R. Keeling, Jun., L.D.S., Ormonde-house, Epsom, Non-Resident.

The Chairman then called upon Mr. Coleman to read the account he had received of the death which had recently occurred at Manchester from nitrous oxide gas.

Mr. Coleman.—Mr. Chairman and Gentlemen: Seeing in the *Times* of Good Friday last the account of a death attributed to the inhalation of nitrous oxide, I at once wrote to Mr. Williams, the practitioner under whose hands the unfortunate occurrence took place, asking him if he would kindly furnish me with all particulars of the event for the information of this Society. By return of post I received a courteous reply from that gentleman acceding to my request, and this morning an account of what took place, together with a report of the *post-mortem* examination, which is as follows :—

*Death of a Manchester Surgeon from Nitrous Oxide Gas.*

The account of this melancholy accident could not, unfortunately, be got ready in time for the last issue of the medical papers.

The following particulars were elicited at the inquest that was held on the 28th of March :—

"On the previous evening, the deceased, Mr. George Morley Harrison, a surgeon, practising at 30, Ardwick Green, Manchester, on completing his usual day's work, called upon his immediate neighbour, Mr. E. H. Williams, dentist, and complained that he was in great pain from an alveolar abscess, and in consequence of which he had not slept the previous night: this was found to proceed from some carious stumps. At his own request, the nitrous oxide gas was administered by Mr. Williams, assisted by his servant. When sufficient of it was supposed to have been inhaled, Mr. Williams attempted to extract the stumps, but the deceased struggled and managed to get up one of his hands to his mouth, preventing Mr. Williams from operating. When the effects of the gas had quite passed off he said, 'You must give me more. You would have caused me infinite agony had you extracted the stumps then. Give me the gas until I snore. I am all right; I am not afraid of it.' When he was again about to administer the gas, the dentist asked him to keep his hand in motion as an index for himself. This he refused to do, saying he must have the gas until he had 'a good snore.' He also

put up his own hands to the face-piece and pressed it firmly to his face. After he gave one snore the dentist proceeded to extract the stumps, but when removing the second, he noticed that the deceased gave no signs of coming to: he immediately had the window and doors opened, dashed cold water in his face and desired the servant to summon Dr. Noble, whose residence was near, with directions, if he should not be at home, to go for Mr. Worsley, the nearest surgeon. When the latter arrived, however, life was apparently extinct, the face and neck were livid, the eyes fixed and open, and the pupils dilated; the hands cold and pale, but the feet and legs quite warm. The usual means were tried; viz., cold affusion, artificial respiration, friction, revulsives to the feet and legs, and the galvanic battery, but without the slightest success.

"The *post-mortem* examination was made eighteen hours after death, by Mr. Jones, Pathologist to the Royal Infirmary: Dr. Noble and Mr. Worsley were present. The body was exceedingly well nourished; the lividity of the face and neck was still apparent; the hypostases also were unusually pronounced. Upon incising the scalp, a quantity of dark fluid blood was found between it and the periosteum; on removing the calvarium, the dura mater was found very adherent; the membranes were distended with serous fluid, and the veins intensely congested. The ventricles also were filled with the same fluid; the brain substance was firm and healthy. On opening the chest, some difficulty was experienced owing to *complete ossification of the cartilages of the ribs.* There was a large deposit of fat in the anterior mediastium and upon the pericardium; the lungs were very dark-coloured and intensely congested. The heart was slightly enlarged, soft and friable, the left side quite empty, the right full of dark fluid blood; there was a considerable deposit of fat in the interventricular furrows. On section, the aorta was found coated with ætheromatous deposits, and the aortic and mitral valves were thickened. On section of the abdomen, an immense amount of adipose tissue was observed, the omentum being also greatly thickened by fatty deposit. The stomach was much distended by gas, and contained a small quantity of partly digested food; the liver

was greatly enlarged and in a state of fatty degeneration; the spleen was healthy, but gorged with dark fluid blood. The kidneys were healthy, but deeply congested."

Mr. Williams in a letter desires me to state that he would, could he possibly have done so, have been present here to-night to answer any questions the members might have desired to put to him; also that Dr. Noble lives next door but one to him, and Mr. Worsley only a few doors further off; so that medical aid was had at once. The apparatus he employed was No. X. in Messrs. C. Ash & Son's catalogue, with Clover's face-piece, and the liquid gas supplied by the same firm and used by him without any admixture whatever. "The sad accident is rendered doubly painful to me and my family, as deceased was my family doctor and friend, and one who never lost an opportunity of forwarding me in my profession." I fear, Sir, we must admit, after hearing the report, that this is really a case of death from nitrous oxide pure and simple; there was apparently no recovery at all from the effects of the agent, as narrated in some of the papers; but upon this point I will not detain the meeting, as I see gentlemen present much better able to offer an opinion than myself. I can only express my sympathy, as I am sure we shall all do, with the gentleman under whose hands so sad an accident has happened, and who, by sending us all information, as well as by his expressions, proves he is actuated by a spirit we cannot do other than commend.

The CHAIRMAN agreed with Mr. Coleman that it was a most important case, but he did not think they would be justified in saying that the gas was *directly* the cause of death without having before them more precise information than they had at present. The tongue might have fallen back into the pharynx and caused suffocation, or the immediate cause of death might have been cardiac syncope. He thought a mistake had been made in administering the gas a second time after so short an interval. At the post-mortem the blood was found very dark, and the internal organs congested; evidently sufficient time had not elapsed for the blood to become properly oxygenated. He thought that in such cases gas should not be given until

after a considerable interval—probably some hours. He should, however, be glad to hear the opinions of some of those present who had great experience in giving the gas.

Mr. Mills also thought that further particulars were needed to make the report of the case complete. It would be most important to ascertain whether artificial respiration was at once performed, and by what method. In the report which had just been read artificial respiration came second only, after cold affusion. Now, in his opinion, cold affusion and open windows were of no use at all in comparison with artificial respiration; in fact, in such cases the skin was generally cool and bedewed with moisture without any affusion. Then the report mentioned that galvanism was made use of, but it did not state in what manner it was applied. If the current was applied continuously it would be useless; but if one pole was applied over the phrenic nerve in the neck, and the other at regular intervals over the diaphragm, it would be of great use by inducing movements of inspiration. In his own practice cessation of respiration had occurred in three cases: in two of these simple pressure with the hand on the sternum two or three times had sufficed to re-establish it. In the third case artificial respiration had to be performed and carried on for some few minutes before the patient thoroughly recovered. He agreed with the Chairman that it was dangerous to give the gas a second time after only a few minutes' interval, especially when the patient had a weak heart. So far as could be judged from the report before them, the post-mortem appearances in this case pointed to death from asphyxia; but it was scarcely possible to give a decided opinion as to the immediate cause of death without having further particulars. Since fatal cases were so rare, it was most important that this one should be recorded as fully and accurately as possible.

Mr. Oakley Coles could not too strongly condemn the practice of the operator administering the gas himself. It was quite impossible for any man to give the gas, look after his instruments and extract teeth, watch the respiration and the

countenance of the patient, see that blood did not run into his larynx, or his tongue fall back in his mouth, perhaps also to assist in restraining his struggles—it was quite impossible to attend to all these necessary particulars at once or within a few seconds of time. The gas should always be given, if not by a legally qualified, at least by a competent, administrator, and the dentist should concentrate his attention on his own work; it was quite enough for him to perform that skilfully.

Mr. J. S. Turner said it must be remembered that the patient in this case was himself a surgeon, and he might therefore be supposed to know what he was about. It was the surgeon himself who insisted on having the gas, and insisted on inhaling it deeply, holding the mouthpiece himself: he forced his will on the dentist against the better judgment of the latter. Mr. Harrison was no doubt culpably rash, and he unfortunately paid the penalty of his rashness. With regard to precautions, Mr. Turner thought that one of the chief points to be noticed was the state of the arteries. He thought that ætheromatous arteries ought to contra-indicate nitrous oxide. When a patient was under the influence of the gas, the venous circulation was greatly congested, and increased work was thrown on the heart in order to force the unoxygenated blood through the capillaries. Now in this case the arteries were calcified and the heart fatty, scarcely fit for its ordinary work, and quite unfit for the extra work thus thrown upon it, especially when it was itself deprived of its natural stimulus, oxygen. If, then, the surgeon had any knowledge of his own state, he was doubly wrong in pushing the inhalation so far as he did. With regard to assistance in giving the gas, he quite agreed that it was most desirable; but competent assistants were not always to be had, especially in the country; and his experience of qualified medical men was, that unless they were accustomed to give the gas frequently, they were more often in the way than not.

Mr. Mummery felt sure that the members present would have but one feeling for Mr. Williams, viz., sympathy with

him in his misfortune. The surgeon undoubtedly took the responsibility on himself, and unfortunately he could not now come forward and confess himself in the wrong. He himself knew of a case in which a surgeon on board ship insisted on one of his brother officers giving him chloroform and extracting a tooth. The amateur dentist extracted the wrong tooth, and the surgeon actually went through the operation again, fortunately without any serious consequences. At the same time he quite agreed with Mr. Coles, that no man could properly perform simultaneously two difficult operations, and he thought that the dentist should concentrate all his attention on his own work.

Mr. Sewill thought that the Society were not called upon to pass judgment either for or against Mr. Williams—and as a matter of fact the coroner's inquest had fully exonerated him—but that they should confine their attention to the scientific aspects of the case. He had seen in some of the daily papers that death had been ascribed to "cardiac syncope," but he did not think that the post-mortem appearances justified such a verdict; he should be glad to hear whether the report he had read was correct in this respect. He wished also to call attention to the fact that the ordinary position in a dentist's chair was a very unfavourable one for the patient if an accident such as they were now considering should occur. In the sitting position the patient's head was very apt to fall forward, and it was impossible to carry on artificial respiration properly. The patient should be at once laid flat on his back, the tongue should be drawn forward with forceps, and the movements of artificial respiration performed.

Mr. Charles Tomes said, in reference to Mr. Turner's remarks, that Dr. Burdon Sanderson had made careful experiments with the sphygmograph in order to ascertain what effect nitrous oxide gas had on the heart and on the circulation. The result of these experiments was to show that the gas did not materially increase the work of the heart; the arterial tension was not increased, and the cardiac excitement

which was often present was due to emotional causes, such as fear and anxiety, and not in any way to the action of the gas. It could now be said with confidence that the gas might be administered to any *healthy* man with impunity, but we had yet to learn what *pathological* changes contra-indicate its use: and even this was more than we could say of chloroform, or perhaps even of ether.

Mr. HUNT remarked that cases of sudden death under operations were not unknown before the introduction of anæsthetics. Sir James Simpson had collected fifteen instances. Such deaths had generally been put down to shock or fright; but, however that might be, he thought the fact should be remembered, and that every death which occurred whilst the patient was under the influence of an anæsthetic should not be at once ascribed to the effect of the anæsthetic.

Mr. STOCKEN said that he greatly objected to giving the gas himself and operating also, but he was sometimes obliged to do so. He always, however, insisted on the patient first getting the opinion of his ordinary medical attendant as to whether he was fit to take the gas. He had found also that the mental state of the patient exercised an important influence. Patients who were anxious or exhausted by pain often took the gas badly, whilst those who were calm and free from fear generally took it well, and felt no pain from the operation.

The CHAIRMAN thought that some important points in the history of the case still required further elucidation; he should be glad to have further information as to the position of the patient; how soon after the alarming symptoms were observed was artificial respiration commenced, and how long persisted in; how was the galvanism applied, and for how long?

Mr. TURNER thought that they could not expect to get very precise or accurate answers to some of these questions. An accident like this happened when least expected. Every one

would be immediately occupied in doing his best for the patient, but they would keep no account of time. It was not like watching an experiment which had been planned beforehand.

Mr. Coleman said that he quite agreed with the Chairman that further information was very desirable, and also with Mr. Turner that they probably would not be able to obtain all that they wished to know; he would, however, write to Mr. Williams on the subject, and he felt sure that both he and his friends would do their best to meet the wishes of the Society.

Mr. Coles would be glad to hear whether any blood was found in the larynx, or whether there was any sign of spasm of the glottis.

Mr. Ashley Barrett said it had always struck him as a curious fact that, whilst the chemical actions of nitrous acid were so similar to those of oxygen—*e. g.* it would support combustion almost as well as oxygen itself—its action in the body should be of such a totally opposite character. He asked whether any satisfactory explanation could be given.

Mr. Coleman said the experiments of Dr. Hermann (second to none probably as a Physiological Chemist) had shown that nitrous oxide was not decomposed in the blood. Dr. Frankland had made extensive experiments leading him to the same conclusion, and he, Mr. Coleman, had made a large number with the same result. Nitrous oxide was dissolved in the blood, but not decomposed. When an animal that inhaled it died, it died from want of oxygen.

In the experiments carried out by the Committee appointed to investigate the merits of nitrous oxide as an anæsthetic, of which he was a member, they found that when an overdose was given to a healthy animal, the heart continued to beat for about from half a minute to a minute after respiration had ceased. If artificial respiration was commenced before the

heart had ceased to beat, the animal invariably recovered, but if the heart's action had once fairly ceased, all efforts to restore animation were useless, and it certainly appeared to him that on artificial respiration depended their best hope in cases of any apparent danger.

Mr. HUNT then exhibited a Morrison's engine, to which he had added a contrivance for working a mallet.

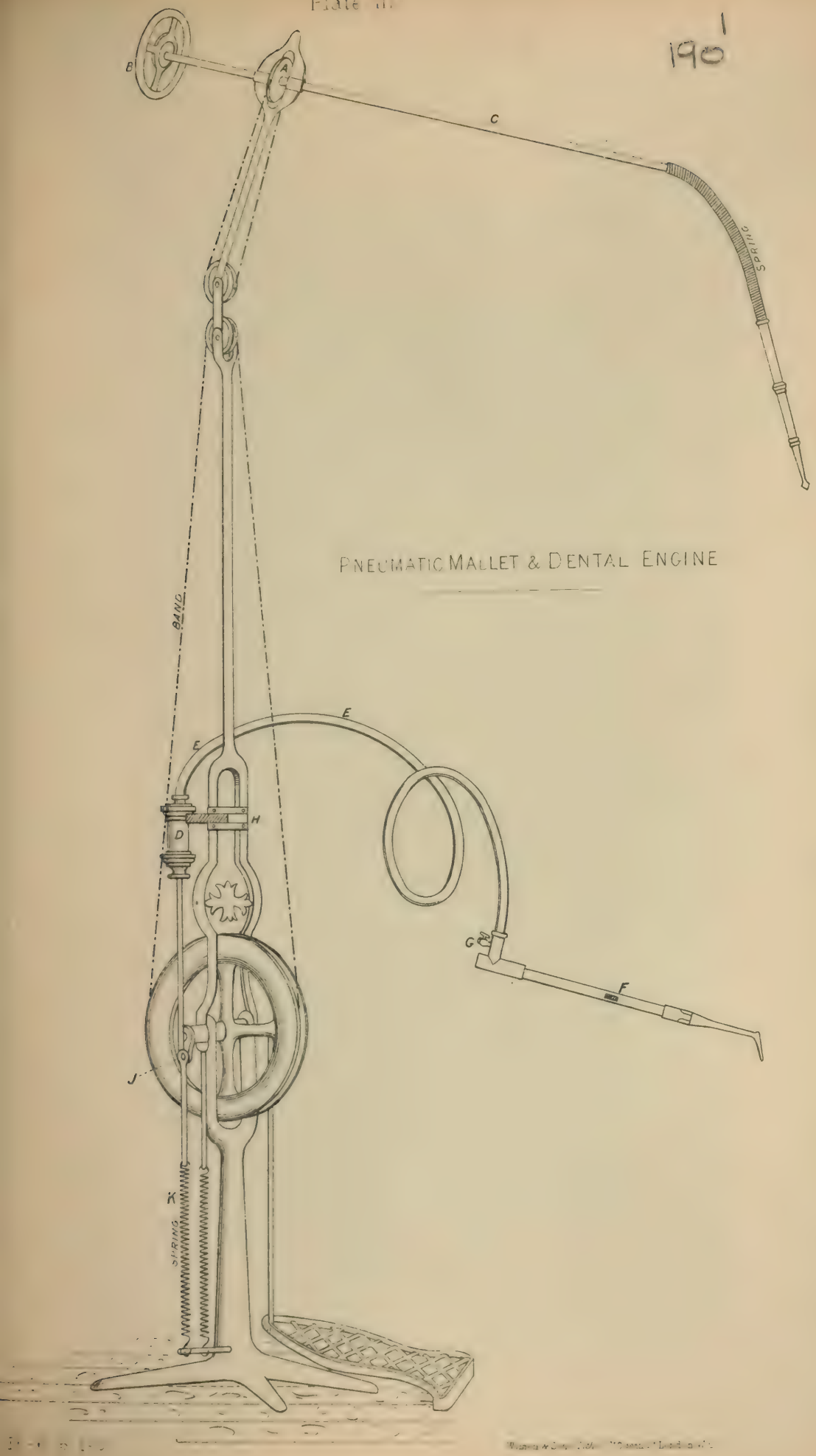
*Description of a Pneumatic Mallet and Dental Engine.*

I have long wished to have a pneumatic mallet driven by the burring engine, so that the two instruments might be combined in one machine, and that in a simple manner. It will be observed that the engine is of the Morrison pattern, and indeed it is one of the earliest of his engines that ever came to this country. I have considerably altered it, and that in some important particulars, which I will point out. The accompanying engraving is drawn to scale, and is one-eighth the actual size. It will be noticed that the driviug-shaft (C) is a steel rod, and this rigid rod I prefer in many respects to the flexible cable of the S. S. White engine. It is not only shortened in its entire length, but about four inches of this driving-shaft are passed beyond the driving-pulley (A), and at this end is attached a fly-wheel weighing four ounces (B), and about three inches in diameter : this fly-wheel gives momentum to the shaft, and also acts as a counterpoise to its weight ; thus the hand-piece is as light as a pen in the hand, and almost as much under command. This modification of the shaft gives great steadiness in drilling, &c., and also great power. The diameter of the driving-pulley (A) is also much increased, so that the original velocity, which was very great, is lessened, while the power, which was inadequate sometimes to the operator's demand, is increased enough for any work required. Thus far for the engine.

The mallet (F) is essentially the same as Mr. Kirby's, and, of course, can be furnished with points as the operator may need. It is likewise connected with an india-rubber tube to a cylinder (D), which is of glass, and in which a piston works. As it is of glass, an intelligent patient may watch and see how

Plate III

1901




PNEUMATIC MALLET & DENTAL ENGINE

the motive power is given to the mallet. The cylinder is about three inches long, and five-eighths of an inch in the internal diameter. It oscillates on a brass tubular joint, which is attached to a brass plate, which is screwed on to the yoke of the engine upright, marked in the engraving at H. The piston-rod is attached by a joint to the termination of the spiral spring (J), which carries the driving-crank over the dead centre.

The piston-rod is therefore driven upwards by the crank (J), driving before it a column of air through the rubber tube, which impels the metal plunger or hammer (F) in the hand-piece. The piston-rod is brought down again as the fly-wheel revolves by the elasticity of the spiral spring (K). I made many experiments before finding what capacity of cylinder would best suit, but the one I have described will give a very hard blow, enough and to spare. If very gentle taps are required, the hand-piece is furnished with a tiny tap (G), which the operator may adjust to suit his fancy, and which enables him to let as much of the impelling air escape as shall diminish the force of the blow to the required extent.

The rubber tube and mallet is only attached to the cylinder when required; it simply "takes off and on" without any screw or fixing of any kind. And when using it, I generally slip the band off the driving-wheel, letting it lie loose.

About two hundred blows a minute can be given with this instrument, and if need be many more. I think that the steady "thud" this mallet gives, operators will find best suited for soft gold work. For long adhesive work, when the blows cannot be too rapid and when they are not required to come with force, I think the electric mallet does and will surpass all others, in spite of the unpleasant noise it makes.

This pneumatic mallet I have had in constant use for the last six weeks, and I am much pleased with its noiseless but efficient action, and I have so assured myself of its labour-saving power, and of its advantage and utility, more especially in cylinder-work, that I have ventured to bring it before the notice of this Society.

Dr. Field, in exhibiting two forms of electric mallet, viz.,

one invented by Dr. Bourvil of Philadelphia, and the other by Dr. Webb of Lancaster, U.S., said he preferred the former, although the first introduced, as being of lighter construction and giving a more delicate and at the same time more effective blow. The advantages possessed by these instruments were the following:—by rapidity of action shortening the time of operation to probably one-third of that expended when compared with the employment of hand, automatic, or pneumatic mallets; the greater delicacy and gentleness of the blow not only rendering the proceeding much less disagreeable to the patient, but also enabling the operator to build gold around and against the frailest walls without endangering the integrity of the enamel, and the perfect control over the instrument by the operator, it being held as is a pen, the lightest pressure only being needed, and the force easily regulated by a small screw. It could, of course, only be used effectively with cohesive gold, and of these the best for the purpose he had found were White's heavy gold foil and their light gold foil rolled into tape; also Jamieson's blocks. The battery employed was the "Improved Bunsen." Three cells would suffice if the instrument were not very constantly used, but otherwise five cells were required, and a good constant current obtained by renewing the solutions in one cell every two days. There were no fumes from the battery. The solutions employed were—in porous cup:—

| | |
|---|---|
| Bichromate of Potash . . . . . | 1 lb. |
| Sulphuric Acid . . . . . | 18½ oz. |
| Nitric Acid . . . . . | 1½ oz. |
| Hot Water . . . . . | 1 gall. |

Outside cup:—

| | |
|---|---|
| Sulphuric Acid . . . . . | 1 part. |
| Water . . . . . | 10 parts. |

Mr. Ashley Barrett then read his paper on the Exclusion of Saliva during Operations in the Mouth.

*On the Exclusion of Saliva during Operations.* By Ashley Barrett, M.B., Lond., M.R.C.S.

Mr. President and Gentlemen,

It seems to me that this is chiefly required for two reasons, and at different stages of the process of plugging—first, during the preparation of the cavity; secondly, while filling it with gold: while dentine is wet it is impossible to make much impression on it with a steel cutting instrument. It then resembles a grindstone, which, while wet, freely cuts the steel which may be brought into contact with it, but which, while dry, is itself readily worn away by friction with an instrument. So we find the burs of the dental engine, that most potent agent in shaping up our cavities, will fail to make any impression on dentine while wet, but will cut it very freely if the tooth be dry. I have heard Morrison's Drill condemned by operators, who, I cannot but think, were unaware of these facts.

The second occasion on which complete dryness is essential occurs while packing the foil; when, unless the surfaces of the gold pellets be free from moisture and other extraneous matter, it is impossible to perform the process of welding in the

cold—on which the solidity of the gold stopping will depend. So much, then, for the necessity of keeping out saliva; now as to the mode of doing so.

I do not altogether know when the rubber-dam was introduced, but I am under the impression that the American dentists first advocated it. It was at any rate introduced soon after the mode of vulcanizing the pure rubber, by combining with it sulphur, which gave it increased strength and elasticity, was discovered. Prior to the employment of the coffer-dam, saliva was excluded from the tooth under operation, by surrounding it with napkins and other materials; also some operators were accustomed by the aid of saliva-pumps to withdraw the fluid from the mouth as it collected. As a rule, these latter schemes were not very successful, and the introduction of rubber sheeting, stretched over the teeth under operation, was hailed as an aid of great value; ere long, however, those who employed it found that its application presented many difficulties, and occupied much time. Instruments were invented to assist the operator in forcing the sheeting between teeth which were closely in contact with each other, and to retain it in its desired situation closely around the neck of the tooth, with its edges, if possible, inverted or tucked inwards beneath the cervical margin of the cavity. Still it was thought by

some that the rubber-dam did not act as efficiently as could be wished, and for some time I have been accustomed to make use of agents which were doubtless in vogue many years ago, or before it had occurred to any one to employ the rubber sheeting for the purpose indicated.

It may be said, and perhaps very truly, that the coffer-dam failed in my hands, and with those operators whose experience is like my own, because we either have not given the subject sufficient attention, or since we lack that manipulative skill which practice alone can give. To this argument I can only reply that I have attempted its use sufficiently frequently, and for a time long enough to justify me to myself in discarding it, and to confirm me in the belief that where it succeeds, other means can also be employed to produce the same results, and with less expenditure of time and trouble, and also that there are many cases where it will utterly fail, in which other means can be employed with perfect success. The objections I would wish to indicate to the rubber-dam are briefly these:—It can be applied to those cases where teeth are very closely in contact, only with much difficulty, and when affixed will often fail at a critical moment in the operation, if the salivary secretion be unusually active, or if the crowns of the teeth are short and of conical form, with the apex directed upwards; therefore

the difficulty in using the rubber-dam occurs in applying it, and in keeping it *in situ*. I have myself not unfrequently found the moisture oozing upwards into my cavity, even though the sheeting apparently retained its proper position; in such cases it is evident that the dam fails, owing to the impossibility of securing complete contact of the rubber with the neck of the tooth, all around the latter. The surface of the tooth has in such cases presented some slight irregularities which have opened the channel for the ingress of fluid—and this in spite of a patient application of the troublesome system of clamps, weights, and strings, which are considered necessary adjuncts to the rubber-dam. Moreover, it must be borne in mind that the tedious application of this process is apt to exhaust what it is so very necessary to economize—the patience of our patients. Now, it may be asked, what can I suggest as a substitute for this material? I reply, the napkin, such as this, of linen, 4 inches by 6 inches in size. Let it be rolled in a rope, and slightly twisted. Then if a lower molar is to be operated on, coil the napkin *well under* the tongue, and bring it over the tooth and behind it, and then forward on the outside of the latter. If this be carefully performed—and with a little practice it is the work of three or four seconds only—we shall with its aid be able to keep the tooth dry for a very long time, suffici-

ently long to enable one to perform any operation, however extensive. The napkin is coiled beneath the tongue in order to occlude the sublingual and submaxillary ducts, and to prevent saliva secreted by those four glands from entering the mouth. And I have noticed that the total amount of fluid from these glands beneath the tongue appears much larger in amount than that from either one of the parotid glands, although the latter weighs more than the glands beneath the tongue. Having then so placed the coiled rope of napkin that it may block up these submaxillary ducts, it should be held *in situ* by the apparatus termed the "tongue-holder," which prevents the tongue from shifting, and also presses the rope firmly against the duct-mouths.

When dealing with an upper tooth there is of course much less difficulty in excluding saliva. In such cases the napkin folded four or five times (thus), and placed inside the cheek, will serve to occlude the parotid duct; and as chiefly from that source can saliva flow on to the upper teeth, the latter may thus be kept in a state of dryness. But in filling an upper tooth, the use of the napkin is mainly required, when it happens that we are treating a molar or bicuspid. In such cases it is important to dam the flow from the parotid. If the tooth be in the front of the mouth, the napkin may be placed in the immediate neighbourhood of

the tooth under operation, and the escape of parotid secretion into the mouth may be disregarded, since the saliva will in no way tend to come in contact with the tooth which is to be filled.

But I have hitherto treated the subject as though the fluid which we so much wish to exclude from the cavity, and the gold which is being inserted therein, was produced solely by the parotid and sublingual glands.

There is, unfortunately, as all soon discover who attempt to plug with gold, a source less fertile, but more irrepressible, than these glandular springs. This is the minute secreting follicles with which the surface of the gums is studded. From these a thin aqueous fluid is being constantly poured forth, and being exuded as it is all round the neck of the tooth which we are filling, it tends, by a process of capillary attraction, to run upwards into the cavity from which we may be doing our utmost to exclude it. This fluid poured forth from the gum-surface does not solely proceed from these small glandular follicles just mentioned, but in great part filters by an osmotic process through the walls of the capillaries, which are soon developed in great profusion in the gum-structure when it has become slightly inflamed from pressure or any other source of irritation. From these two sources then, that is to say, from

the small glands and through the walls of the capillaries, springs this aqueous secretion which can, as a rule, be prevented from entering the cavity by thrusting between the tooth to be filled and its neighbour—for this purpose I find a large wooden match answers well. It should be about two inches long, and gradually tapered. It is not necessary to adapt it to the triangular form of the interdental space, as is by some operators advised, since its softness and compressibility enable it when forced in to adapt itself to the surfaces of the teeth. It soon absorbs moisture, and swelling up in consequence, quite prevents any upward flow of fluid between the teeth. Thus, with the napkin and wooden wedge I believe we may control almost every case.

In conclusion, I must offer an apology for bringing before the Society such a very simple matter as has formed the subject of my paper, but I have done so in the hope that in some way information may be gained thereby.

## Discussion.

The Chairman said he rarely used the rubber-dam. He used small pads, three to four inches square, of soft linen, and not hemmed, as that gave them an unpleasantly hard edge. In filling a lower tooth he used four of these; one he folded to about $\frac{3}{4}$ inch square, and placed it over the orifice of the sub-lingual ducts; another he folded longways and placed one end on the square pad and the other near the tooth to be operated on: of the others he placed one over the opening of the parotid duct, and the other below, between the cheek and the gum. He did not use the tongue-holder, as he found it irksome to the patient; he either kept the tongue down with one finger, or got the patient to do so. He did not trouble to exclude wet during preparation, and did not find that it caused him any inconvenience so long as the hole was occasionally cleared of debris. He thought that the explanation of Mr. Barrett's difficulty was that if wet was partially excluded the damp detritus would clog the file or burr; but if the cavity was thoroughly wet, as by using the spray occasionally, it appeared to him that the instruments cut better.

Mr. Coleman said he was obliged to confess that he did not very frequently employ the rubber-dam, probably because of the trouble in so doing and the inconvenience it caused the patient; but he would candidly admit he thereby wronged his patients every day of his life, for its advantages would more than counter-balance every trouble and inconvenience.

Dr. Field was surprised to hear a return to those primitive ways recommended. He himself was strongly convinced of the advantages of the rubber-dam. He could adjust it quite as quickly as he could pack the mouth with rags. He thought, however, that the details of its application were not always so

well understood in this country as they should be. First, very thin elastic rubber should be used, and secondly, the hole should be small. It was a common mistake to make the hole too large; and in passing the rubber over the tooth it was important not to get the free edge directed upwards. Instead of keeping an array of punches, he was in the habit of making the hole by stretching the rubber over the head of an excavator, and shaving off the top with a sharp knife. A perfectly neat and round hole was thus made, and the size could be varied by the extent to which the rubber was stretched. He used waxed floss silk to force the rubber between the teeth, and had found this answer admirably. Clamps were only necessary in extreme cases. He had also occasionally used small wedges of hickory-wood, but the silk was generally sufficient, and, of course, clamps and wedges were very irksome to the patient. He could put on the rubber-dam and adjust it comfortably in two minutes.

Mr. Charles Tomes also spoke in favour of the rubber-dam, but admitted that he had met with more difficulty in using it than Dr. Field seemed to have done.

Mr. Turner said he also had found it troublesome at first, but he had persevered in its use, and he found that the difficult cases became rarer as he gained more experience with it. He now always used it except with Sullivan's stopping, and he thought it well repaid the time and trouble which had been spent in learning its use. The patient was free to talk, yawn, or cough, and the dentist could leave him for a short time without the risk of finding his work spoilt. The more he used it the better he liked it. The rubber might slip, but pads were more easily displaced. He did not think it altogether creditable to the dental profession that they had never in any way acknowledged their debt to Dr. Barham, the inventor of this mode of procedure. Dr. Barham had published his contrivance freely to the world, and thoroughly deserved some acknowledgment of his liberality. The dentists in America had presented him with a testimonial, and Mr. Sercombe had it in view to get

up a similar movement in this country, but his death prevented it. Mr. Turner hoped, however, that something might yet be done.

After a short reply from Mr. Ashley Barrett, the Chairman, after thanking Mr. Barrett for his paper, and Messrs. Coleman, Hunt, and Field for their communications, adjourned themeeting to Monday, the 7th May, when a paper would be read by Mr. Moon on "Irregular and Abnormal Tooth Development," and when, also, he hoped they would have a further discussion on the death from nitrous oxide at Manchester.

# REPORT OF THE COMMITTEE

ON THE

# SUPPOSED MERCURIAL POISONING BY COLOURED VULCANITE.

AN impression has long prevailed that it was possible for the salts of mercury, used to colour red vulcanite, to exert a poisonous influence where red rubber plates were worn in the mouth; and the attention of the Odontological Society having been strongly drawn to the subject by Dr. Bathurst Woodman's papers (see "Trans. Odont. Soc.," 1875), relating cases of supposed mercurial poisoning from this cause, a committee was appointed to collect evidence and report upon the subject.

The committee find it convenient to make their report under two heads.

(I.) Evidence derived from the observation of cases occurring in practice.

(II.) Evidence as to the *à priori* probability or possibility of the occurrence of the supposed poisonous effects.

In order to collect information referable to the first head, the committee issued a number of circulars embodying the following series of

questions, ninety-six of which were filled in and returned :—

## QUESTIONS.

1. How long and to what extent have you used vulcanite ?
2. Has your attention been previously drawn to the subject under investigation ?
3. Have you observed any local or constitutional symptoms which you attributed to the use of coloured vulcanite plates ?
4. Specify any such symptoms.
5. Have you observed similar symptoms when Black Vulcanite or Metallic Plates have been worn ?
6. In the case or cases to which you refer, state whether the plate was used for carrying artificial teeth or for regulating purposes.
7. State, if possible, the sex, age, station, and habits of patient.
8. Were there any unhealthy stumps or teeth remaining, and what was the general condition of the oral mucous membrane ?
9. Were parts of the mouth, not covered by the Plates, healthy or otherwise ?
10. What was the general condition of the mouth as to cleanliness ?
11. Was there evidence of syphilis or of the use of mercurial medicines ?

12. Was a plate of any different material substituted for that which you believed to have originally induced the unfavourable symptoms, and what was the termination of the case?

13. Specify, if possible, the particular rubber used, the method of cooking (with reference to its perfect vulcanization), and the metal, if any, used in combination with the rubber.

Out of this number sixty-six give a decided answer to the effect that they have not seen any symptoms which they attributed to the use of coloured vulcanite.

Thirty reply that they have seen local symptoms, but constitutional symptoms are not mentioned in any of the replies as having been noticed.

Of the thirty papers named as reporting having seen local symptoms, twenty-one are answered in such a manner as to be inconclusive.

Throughout the thirty the following disturbing causes are mentioned. In

6 papers uncleanliness is mentioned.
4 „ unhealthy stumps.
4 „ imperfect vulcanization.
1 „ misfit.
3 „ symptoms disappeared without change of material; and in one of these cases the plate was worn 18 years afterwards.

6 papers gold substituted with relief.
1 „ dental alloy substituted with relief.
1 „ whalebone rubber ditto.
2 „ gold substituted, but without cure.
1 „ dental alloy ditto.
1 „ black rubber substituted with some improvement, but without cure of redness.
2 „ black rubber with pink gum is supposed to have caused the trouble, or rather, pink gum on black rubber.
2 „ cases not able to be followed up.
3 „ doubted by those reporting them.
1 „ known to have been previously salivated.
1 „ known to have had syphilis.
1 „ symptoms occur with black rubber.
2 „ hearsay cases; one disproved by the person making the report.

In the sixty-six papers giving a negative answer reference is made by many to occurrence of similar symptoms with gold or black rubber plates.

One called attention to bad dietary, several to the non-conductive power of vulcanite. One to the fact of the patient having suffered from eczema as a probable cause of disturbance.

One paper calls attention to the readiness with which pink rubber loses substance by friction; and another relates a case of arrest of salivary

secretion, which was restored under treatment and the piece worn afterwards with comfort.

And out of the thirty giving a more or less qualified affirmative answer, many might with more propriety have given a negative answer, as may be inferred from the foregoing brief analysis.

The symptoms related are chiefly local redness, increased or decreased flow of saliva, looseness of teeth, &c.; in no single instance are such symptoms related as would lead the committee to infer that the case was due to the effect of mercury rather than to other and more direct causes. The form of ulceration upon which so much stress has been laid as being characteristic of the effect of mercury is not mentioned as having occurred in any case.

In fact, the inquiries of the committee have utterly failed to establish the existence of a single case of unquestionable, or even probable mercurial poisoning due to the use of red vulcanite plates.

Under head II. the committee have little to add to the exhaustive report of Dr. Attfield, which has been placed at their disposal by the kindness of Messrs. Ash & Sons, at whose instance the experiments herein detailed were undertaken.

# A REPORT ON THE INNOCUOUS NATURE OF RED DENTAL VULCANITE.

By Professor Attfield, F.C.S.

*Professor of Practical Chemistry to the Pharmaceutical Society of Great Britain; Author of a Manual on General Medical and Pharmaceutical Chemistry; etc.*

London, 17, Bloomsbury Square, W.C.
*April 2nd*, 1875.

*To* Messrs. Claudius Ash & Sons,

Broad Street, Golden Square, London.

Gentlemen,

In accordance with your instructions, I have made "an investigation of the influence, if any, of saliva and the other fluids of the human body on the pink and red varieties of vulcanite used by dentists in making artificial teeth-plates, gums, and palates"; and I now report results.

I understand from you that these tinted varieties of vulcanite are made by heating pink or red "dental rubber," under pressure, to a temperature of 310° to 315° F. (154° to 157° C.), and that this "dental rubber" is prepared by incorporating sulphur and vermilion with pure indiarubber.

The innocuous nature of two of the three components of tinted vulcanite is admitted by everybody; sulphur and the indiarubber of vulcanite, as exposed in the mouths of persons wearing artificial teeth, are perfectly harmless. Vermilion, however, demands detailed notice from me. I will afterwards describe my experiments on the completed vulcanite made from these three substances.

Vermilion, sometimes termed cinnabar or red sulphide of mercury, has been celebrated from the earliest recorded times for its beautiful scarlet-red colour, both Jeremiah and Ezekiel alluding to it as a paint or pigment. As a medicinal agent it has always been found to be inactive

and useless. It is true that until recent years the medical colleges of most countries gave, in their Pharmacopœias, directions for its preparation. But it was recognised medicinally only as a fumigating agent in certain affections of the mouth and throat, being, for this purpose, sprinkled freely on a hot iron shovel and the fumes inhaled. Even under these circumstances any medicinal action that was produced was not due to the vermilion as vermilion, but to other compounds of mercury as well as to certain sulphurous gases into which the vermilion was converted by the heat. Vermilion itself, according to the experiments and observations of the greatest French authority on such matters, Orfila, is inert, for he found that "no effects were produced on dogs by half an ounce, either when applied to wounds or when taken into the stomach." In America it appears to be used rarely even in fumigation. In the "United States Dispensatory," however (twelfth edition, 1865), there is a statement which shows that if given internally the dose may be from ten to thirty grains in electuary or bolus. From this, by the way, an inference may fairly be drawn that if the wearer of a tinted vulcanite teeth-plate swallowed the whole of it, the vermilion in it, even if unprotected by the indiarubber, could not do him any harm. In Great Britain, vermilion or cinnabar is not now recognised as a medicinal agent. Taylor "On Poisons" (second edition, page 475) says:—"Cinnabar . . is well known as a red pigment, and is often employed in colouring confectionery and wafers. I have not," he says, "been able to find any instance of its having acted as a poison on man. . . . Cinnabar is sometimes used for giving a red colour to ointments — *e. g.*, the sulphur ointment. In such cases," he continues, "the quantity is very small, and can do no injury even if swallowed."

In short, vermilion is obviously so harmless a substance,—that is to say, its action on the human system is so insignificant,—as to be unworthy the notice of medical men, and, therefore, of the public generally.

Combined with sulphur and indiarubber, vermilion might, with reason, be expected to be even still less likely to be affected by, or to affect, the fluids of the human frame. For indiarubber and the hardened indiarubber termed vulcanite are each of so insoluble and

inactive a nature that either would probably retard rather than accelerate any action between a substance mixed with it and the saliva or gastric fluids. Then no soluble chemical compound of vermilion and indiarubber is known or is likely to exist, or ever to be found. Nevertheless, the importance of the question now under investigation, on account of the wide-spread use of tinted vulcanite, demands that actual experiments shall decide on the inaction or action, if any, of saliva, and even of stronger saline, acid, and alkaline fluids, on pink and red vermilion-coloured artificial gums, palates, and teeth-plates.

In the experiments about to be described the influence of various liquids both on pink and on red vulcanite was first examined. Secondly, the effect of the fluids on an unvulcanized mixture of the ingredients of tinted vulcanite,—that is to say, their action on "dental rubber,"—was investigated. Thirdly, the question was decided as to whether or not any compound of mercury soluble in saliva, etc., is set free when the metallic pins and braces used by dentists are heated with dental rubber in the process of vulcanization.

*Experiments on Tinted Vulcanite.*—The vulcanite was finely shredded and a small teaspoonful of the shreds placed in the respective fluids. Thirteen fluids were selected, representing the liquids of the mouth and stomach, solutions of salts, acids, alkalies, and spirits. The pink and red varieties of the vulcanite were separately treated. One set of twenty-six vessels containing the shreds and solvents was placed in a chamber carefully and continuously warmed to 98° F. (37° C.); that is to say, the mixtures were kept at about the natural temperature of the mouth. The temperature of other vessels and their contents varied with the temperature of the air in January, February, and March. Each mixture was frequently stirred or shaken, so that each was freely exposed to atmospheric influences. The experiments were continued from day to day for one, two, three, and four weeks, and each fluid was tested from time to time for mercury by sulphuretted hydrogen, by electrolysis, and, in short, by the most delicate tests known to chemists.

1. *Saliva.*—At ordinary temperatures there was no action on the first day, nor on the second day. After another day or two the mixtures smelled sour, and after

two or three days had the smell of decaying beef; no action. At the end of a fortnight no action.

Other mixtures of the pink shreds and saliva, and of the red shreds and saliva, were exposed at the temperature of the mouth for six hours daily for several weeks. The fluids were frequently tested for mercury, but no trace of that metal was detected.

2, 3, 4. *Solutions of* (2) *sulpho-cyanide of potassium, two parts in one thousand parts of water;* (3) *of chloride of sodium, of similar strength; and* (4) *of the sulpho-cyanide one part, the chloride one part, and water one thousand parts.* In these respective liquids the different shreds of vulcanite were exposed as already described. During the first week of treatment no action occurred; at the end of the second week, no action; at the end of a month, no action.

5. *Pepsin.*—The influence of pepsin was next investigated. Ten parts of pepsin and one thousand of water, containing fifteen of strong hydrochloric acid, were mixed. Such a mixture, kept at 98° Fahr. for a few hours, will, as is well known, dissolve solid food in the manner in which solid food is dissolved in the stomach; indeed, it may be regarded, for all experimental digestive purposes, as the actual digestive fluid of the healthy sheep, pig, or calf, from which pepsin itself is obtained. Portions of the tinted vulcanite shreds were placed in different quantities of this pepsin-fluid at the temperature of the body, treated as before mentioned, and occasionally tested for mercury. No action occurred after one day, two days, a week, two weeks, four weeks.

6, 7, 8. *Alkaline Liquids.*—In aqueous solutions of (6) caustic potash, (7) hydrate of sodium, and (8) ammonia, each having a strength of about five per cent., the shreds were soaked, at the temperature of the body, for days and weeks. Not the slightest trace of mercury was dissolved.

9, 10, 11, 12. *Acids.*—The vulcanite shreds, pink and red separately, were also soaked, under the conditions just described, in (9) vinegar containing about five per cent. of acetic acid; in (10) a mixture of nitric acid one part to water five parts; in (11) sulphuric acid and water, one to seven; and (12) in diluted hydrochloric acid, one to nine. The digestion was continued as before for six hours daily for three weeks. The hydrochloric acid, when tested,

yielded faint traces of a metal, so slight that by no reagent could it be proved to be due to mercury. The other acid liquids afforded not the slightest evidence of the presence of mercury.

13. *Alcohol.*—Spirit of wine one part to water three parts did not extract a trace of mercury from the vulcanites at any temperature.

*Experiments on "Dental Rubber."*—The objects of these experiments was the determination of the action, if any, of the thirteen solvents previously described, not only on imperfectly vulcanized materials, but on the actual raw material of vulcanite. A description of these experiments is unnecessary; they were conducted as before for ten days or a fortnight. The dental rubber was also cut into shreds so as to expose as great a surface to the fluid as possible, and thus to make the experiments fully as severe as the former set. The results may be summed up in one sentence. Neither saliva, acids, alkalies, saline solutions, nor spirits, affected the dental rubber.

*Experiments on the Action of Metals on "Dental Rubber," at the Temperature of Vulcanization, and on the Influence, if any, of Saliva, etc., on Vulcanite containing such Metals.*—The metals employed in these experiments were those commonly used for fastening artificial teeth into vulcanite, and for bracing and strengthening the different parts of the teeth-plate, namely, sixteen-carat gold, hard platinum (iridio-platinum), and "dental alloy" (platinum one, silver three parts). Some other metals, stated to have been found embedded in vulcanite teeth-plates, were also experimented upon, namely, nine-carat gold, German silver (copper, zinc, and nickel), brass (copper and zinc), iron, steel, copper, tin, and lead. Two wires of each metal were imbedded in a tablet of dental rubber tinted with vermilion; indeed, there were prepared two such red tablets for each metal. The twenty-two tablets were then vulcanized in the usual way by heating to the proper temperature, and under the proper pressure, for the proper length of time. One of each couple of tablets was then physically and chemically examined, the other being kept for future reference. A smart blow of a hammer on a chisel laid bare a wire and its bed. After a careful scrutiny, both with the naked eye and with the aid of the microscope, the wire and vulcanite fragments were gently warmed with nitric acid

and water (one to eight) the resulting liquid evaporated to dryness, the residue moistened with strong hydrochloric acid, again evaporated to dryness, and the latter treatment repeated. The last residue was finally diluted with water, and tested for mercury. Besides this severe process, some milder methods were employed in appropriate cases.

The sixteen-carat gold and the nine-carat gold, when chiselled out of the vulcanite were found to be slightly tarnished, and the channel which the wire had occupied had a dull metallic appearance, but neither the wire nor the fragments of vulcanite yielded the slightest trace of mercury to the acids or any of the many solvents already mentioned.

The platinum, the dental alloy, the tin, and the German silver, were not altered in appearance. No evidence of the occurrence of free mercury or any soluble compound of mercury could be obtained from the wires or from the beds they had occupied.

The steel had scarcely been affected by the vulcanizing operation, and had not produced any mercury or, as proved by experiments with solvents, any soluble compound of mercury.

The iron was superficially converted into sulphide of iron, doubtless by the free sulphur of the "dental rubber," for no mercury could be extracted by the solvents.

The lead had similarly affected and been affected by the dental rubber, but no soluble form of mercury could be detected.

The copper and the brass were somewhat deeply corroded by the sulphur of the prepared rubber; but the cinnabar of the mixture was not degraded. In both cases the corrosion was proved to be due to the formation of a thick coat of sulphide of copper, which crumbled readily between the fingers; but no trace of mercury was detected, and even moderately strong acids failed to extract mercury in any form.

## Conclusions.

1. So far as any action on man is concerned, vermilion is a harmless substance.

2. So far as any effect or influence of the vermilion is concerned, the mixture of vermilion, sulphur, and india-

rubber, commonly termed "dental rubber," is also a perfectly innocuous substance.

3. Pink or red dental vulcanite, even when placed under the severest conditions of experiment, does not yield any trace of mercury to saliva or indeed to other far more powerful solvents.

4. The metallic pins and braces in dental vulcanite do not displace mercury, or induce the formation of any compound of mercury soluble in saliva or in more powerful solvents.

5. The results of this investigation are such as would be anticipated by chemists. For, first, vermilion is well known to be of the most repellent or sluggish nature as regards any action on it by ordinary solvents, or even by corrosive fluids. Secondly, india-rubber, or the sulphurized or hardened india-rubber termed vulcanite, is, as regards resistance to corrosion or solution, one of the most chemically obstinate of substances, and would well play the part, if necessary, of protector from chemical attack of any material well mixed in it. Thirdly, even if metals extracted sulphur from vermilion, at the low temperature of vulcanization, as they do at a far higher temperature, they would do so because of their great affinity for sulphur: hence would properly be expected to combine with the free sulphur mixed with the vermilion and india-rubber in preference to the sulphur already intimately chemically combined with the mercury.

6. The harmlessness of vermilion vulcanite should also be anticipated by medical practitioners; for it has been extensively used for the last fifteen years, and during that time hundreds of thousands of persons in Europe and America have worn, and are now wearing, pink and red vulcanite teeth-plates, and it is inconceivable that any widespread or even occasional harm resulting therefrom could elude the trained powers of observation of physicians and surgeons. The medical records, extending over many years, show that only three writers have ever suspected or regarded vermilion vulcanite as liable, in extremely rare cases, to be somewhat mischievous, and in these cases that the fault lay with the vermilion was not conclusively proved.

7. Though, however chemistry and medicine would concur in forecasting the innocuous nature of vermilion vulcanite, experimental evidence of its harmlessness should

be most acceptable; for the integrity of a substance worn within the mouths of men and women in all civilized countries must be beyond suspicion.

8. I am of opinion that vermilion vulcanite teeth-plates are practically unaffected by saliva or by any substance which ever gains access to the mouth; and, in short, that the pink and red vulcanite artificial gums and palates now so generally worn are absolutely harmless.

I am, Gentlemen,

Your obedient Servant,

JOHN ATTFIELD.

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In concluding this section of their report the committee would call attention to a fact which bears upon the *à priori* probability of deleterious results following prolonged contact with vermilion, even when not locked up in the interstices of vulcanized rubber—namely, that men employed in vermilion-works, who are constantly red from head to foot while engaged in their occupation, do not suffer from any local or constitutional symptom of mercurial poisoning.

The committee, however, are of opinion that in a certain small percentage of cases vulcanite may exercise some irritating effects upon the tissue with which it is in immediate contact; but there is not the smallest evidence that these effects are due to its chemical composition, or, at all events, to the vermilion which it contains,

inasmuch as precisely similar results are recorded as occurring in connection with the use of the uncoloured vulcanite.

HENRY J. BARRETT,
EDWIN SAUNDERS,
CHARLES S. TOMES,
J. SMITH TURNER,
SAMUEL CARTWRIGHT,
*Chairman.*

# GENERAL MONTHLY MEETING,

*May 7th*, 1877.

S. CARTWRIGHT, Esq., President, in the Chair.

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The Minutes of the previous Meeting were read and confirmed.

The following gentlemen were nominated for membership :—

Mr. Martin Luther Bell, L.D.S., St. Marget's-street, Canterbury, Non-Resident.

Mr. Arthur Grenville Levason, 12, Bridge-street, Hereford, Non-Resident.

Mr. Claude Rogers, M.R.C.S., L.D.S., D.M.D. (Harvard), Cork-street, W., Resident.

The following gentlemen were elected members of the Society :—

Mr. Benjamin Ephraim Manville, M.R.C.S., 5, Grosvenor-street, Resident.

Dr. Arkövy, Doctor of Medicine and Surgery, Master of Dentistry, &c., Budapest, Non-Resident.

Mr. Oakley Coles exhibited an india-rubber saliva-bag, invented by Mr. Vanderpant, of Kingston, and sent by the Dental Manufacturing Company; he thought it would be useful in long operations with the rubber-dam, as being a comfort to the patient and protecting the dress.

Mr. Coles also exhibited a movable arm-rest, made by the Dental Manufacturing Company from the designs of Dr. Pierrepont, of Manchester; it was intended to afford a comfortable and easily-adjusted support for the left arm during prolonged operations.

Mr. Turner read an abstract of the Report of the Committee appointed to inquire into the cases of supposed poisoning by coloured vulcanite. (The full text of this Report appeared in the last number of the Transactions, p. 203.—Ed.)

Mr. Coleman said that as he had himself suggested the appointment of the Committee, he had now great pleasure in proposing a vote of thanks to them for their very able report. No doubt all had anticipated the result of their investigations, but they would now have the satisfaction of being able to assure their patients that it had been positively proved by the most carefully-conducted experiments that there was nothing deleterious in the ordinary dental rubber.

Mr. Woodhouse seconded the motion, which was carried unanimously.

The President said that as Chairman of the Committee it was his duty to return thanks on its behalf. He felt bound, however, to state that Messrs. Turner and Tomes had undertaken the greater part of the work, and therefore deserved the largest share of the credit. He then called upon Mr. Coleman to read the further particulars which he had received relative to the death from nitrous oxide at Manchester.

Mr. Coleman said that after the last meeting he received numerous queries and suggestions from different members of the Society. He arranged these and combined them into a series of questions. These he had sent to Mr. Williams, and would now read them, together with the answers which Mr. Williams had appended.

*Q.* (1) How long was the patient inhaling the gas at the second administration, and about what quantity was inhaled?

*A.* He went off quickly. I cannot tell the quantity of gas exactly, as I did not weigh the bottle before or after, but I think *under* 5 gallons.

*Q.* (2) What were the first alarming symptoms other than those named in the report, viz., the not recovering consciousness, appearance of patient, &c.? Had respiration ceased, could pulsation be felt in the radial artery, &c., or was the heart's impulse felt? If so, how long did either continue?

*A.* Mr. Harrison's skin was naturally pale. I saw no change of colour to alarm me. It was the respiration ceasing as I was wrenching the second stump that made me desist and try means at once to recover him. I beat him on the face with cold water, lifted him on to the floor, opened his clothes, felt the heart, which had ceased to beat, and at once began artificial respiration.

*Q.* (3) How long was the patient left in a reclining position in the chair after respiration ceased? Was artificial respiration performed? If so, how soon was it resorted to? How long was it kept up without interruption, and what method was employed? Was the tongue drawn forward at the commencement of artificial respiration; if so, had it apparently faller back?

*A.* He was not reclining, but sitting upright. The first medical man who arrived continued with me the artificial respiration. Working the arms to try and inflate the lungs. His mouth and tongue were all right.

*Q.* (4) Which were the roots removed, and from which jaw? Was the first taken out of the mouth? Could it or blood, can you suppose, have produced spasm of the glottis, or any other foreign material?

*A.* The bicuspids in lower jaw, left side. Nothing could have got into the throat, as the head was rather forward than back, and as I operated with the light from a reflector thrown full on the patient, nothing in the mouth could have escaped my notice.

*Q.* (5) In what order were the different restorative measures applied? The windows and doors by whom opened? At what period was the servant despatched for assistance?

*A.* First. Having the patient in a thorough draught and beating the face with a wet towel. Secondly. Working the arms to inflate the lungs, which was continued by the medical men, while his feet and legs were rolled in a blanket, hot irons applied to the soles of his feet, and mustard to the calves of his legs. This treatment was continued until a powerful battery was brought and applied.

As my assistant had left for the evening, Mrs. Williams came to the operating-room and she opened the window during the operation, and helped me with the patient while the servant ran for a doctor. I sent her the moment I had extracted the second stump, even before I had the slightest idea he was dead, wishing to have medical aid in bringing him round.

*Q.* (6) What was the opinion of the pathologist who made the post-mortem examination as to the cause of death? and did the other medical men concur therein?

*A.* I have not had the opportunity of seeing Dr. Jones, the pathologist, since I received these questions. Mr. Worseley laid great stress on the ossification of the ribs.

The PRESIDENT said that Mr. Williams had evidently done his best to supply the information which they wished for. The case was of the greatest importance to the profession, and he should be glad to hear any suggestions which the members present, with the additional facts now before them, might be inclined to make.

Mr. WEST said that the death of a woman under nitrous oxide gas had been reported at University College Hospital. He should be glad to hear some particulars respecting it.

Mr. STOCKEN asked whether the quality of the gas had been tested? He had on one occasion given the gas for four minutes to a patient, but without producing unconsciousness. After

trying the same gas on three other patients with similar results, he returned the bottles.

Mr. Coleman answered that the fatal case at University College Hospital was that of a woman suffering from stercoraceous vomiting, due to a strangulated hernia. She vomited just before death, and at the post mortem feculent matter was found in the larynx and bronchi. Her death, therefore, could not be directly ascribed to the gas. As to the quality of the gas used by Mr. Williams, that gentleman stated in his first communication that it had been obtained of Messrs. Ash. The gas they supplied was made in very large quantities at a time, and distributed widely, and as therefore precisely similar gas must have been used by many operators and no other complaints had been made, the presumption was strongly against the idea that the death was due to any impurity in the gas.

The President then called upon Mr. Moon to read his paper.

## *On Irregular and Defective Tooth Development.*

By Henry Moon.

Mr. President and Gentlemen,

The subject that comes before us this evening has received attention from such able investigators that it has become difficult to say anything new about it that is also true. On this account I should have brought under the notice of this Society, through "Casual Communications," some interesting specimens that I have here, had it not seemed to me that, though a paper might contain no novelties, yet, by inviting discussion, and perhaps by leading to concerted observation among us, it might serve to more clearly establish some truths, and clear up some doubtful points in Odontology.

Under the title of "Irregular and Defective Tooth-formation" I propose to consider two classes of cases, each of practical interest from a surgical or medical point of view. Under the one class I will range and glance at those cases in which excessive or erratic development has resulted in either the formation of supernumerary teeth, or in the abnormal developments known as Odontomes; and under the second class those vagaries of tooth-formation which result in deficient size,

or defective form, of any of the normal series of teeth.

It has appeared to me that these dental irregularities of excess and defect might have light thrown on them by being considered together with what may be called the normal architecture of the teeth.

The fact that the crowns of human teeth are formed around a single dentinal system, seems to have prevented the full recognition of this, I believe, other fact, viz., that the variety of form in the several classes of teeth (fitting them for the office which they have respectively to perform) is due to a multiplication and modification of a simple and elementary tooth-form. These elementary forms appear to *re-assert their autonomy* under disturbed conditions of development. One of these denticles is shown to us separate in the most common and simple supernumeraries, consisting of conical crown and tap-root. (Pl. IV., figs. 1 and 1A.)

Viewing the labial surface of unworn well-formed upper front teeth in man, we see in the Incisor,—by the three tubercles on its cutting edge, and sometimes by two vertical lines or slight depressions on its face,—that three lobes or columns of equal size go to build it up; while on looking at the Canine we see the central lobe of its labial surface magnified, while the side

## PLATE IV.

Represents specimens referred to in accompanying Paper.

Figs. 1 and 1a. Separate Denticles of the simplest form.

Figs. 2, 3, and 4. Denticles united with teeth.

Fig. 5. Two Supernumeraries of bicuspid form in complete union with a lower wisdom-tooth.

Fig. 6. A two-cusped Supernumerary, blending at one point with a molar.

Fig. 7. Lingual surface of a so-called cubic tooth.

Fig. 7A. A T-shaped temporary Incisor, viewed from its cutting edge.

Figs. 8 and 9. Two specimens from the same mouth, consisting of irregularly bundled-together denticles, which held the place of upper incisors. In Fig. 10 the root expands into a radicular odontome.

Fig. 10. Radicular Odontome of simplest form, resulting from hypertrophied dilated condition of root. The position held by this tooth in the mouth is shown in fig. 1, Plate V.

Figs. 11 and 11a. Two Odontomes, which were the representatives of an absent lateral incisor and a canine, and gave rise to two distinct dentigerous cysts.

Figs. 12 and 13. A slightly diagramatic representation of the differences between normally-formed teeth and those that are malformed through inherited syphilis: *a*, upper incisors; *b*, first lower molar; *c*, first upper molar, viewed from mesial aspect.

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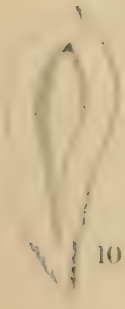

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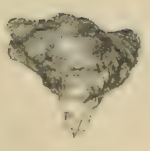

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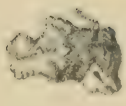

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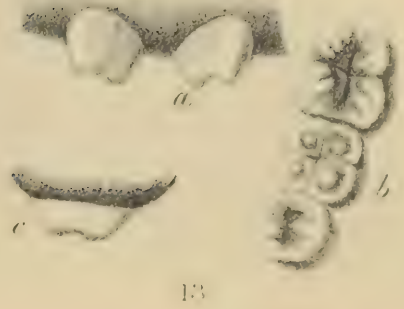


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ones are reduced. On the lingual surface of the incisors sometimes a central cusp, sometimes two side cusps, are more pronounced.

The form of the bicuspid shows the more even development of the lobes on its buccal and lingual aspects, while the molars (speaking very broadly) duplicate the pre-molars.

I might point to comparative dental anatomy to support the theory of a tendency to the separate development of denticles before they blend, *e.g.*, to the distinct plates in the molars of the capybara —to the molars of the elephant, with its transverse plates of dentine (which are probably each built up of many denticles, giving to it, by their conical points, its mamillated character), and which plates remain distinct for a time, but unite to form a common pulp-cavity; and also to the molar of the mastadon, transitional as this is in character, towards the elephant's molar, as pointed out by Mr. Charles Tomes, in his recent work on "Dental Anatomy." However, confining our attention to human teeth, the cases which we shall consider will, I think, show that the prominent points of the dentinal pulp first to be capped with dentine are liable to individual modifications as to form; while the fact that partially distinct denticles sometimes group themselves as the lobes are seen to be arranged in a normal tooth, gives a significance to such arrangement, and, at the same time,

points to a source of derivation for denticles which are developed separately. A fact which I observed a week or two ago will enable any one to easily satisfy himself as to the architectural nature of the incisor.

In the case of patients who possess transparent enamel, it will be found easy to see by transmitted light the outline of the dentine within. In some cases (and in the first case I noticed it was strikingly marked) the dentine of ivory-like colour showed through the pearl-like enamel in three separate circular-topped columns, which remained distinct for some little distance; in a second case, where, in place of the central tubercle of enamel, two smaller tubercles were present, I could distinctly see the corresponding division in the points of dentine. In others, the cutting edge of dentine presented an unserrated line. Individual denticles vary greatly in size, and under unusual conditions of growth would naturally be particularly prone to erratic development. To these causes I should be inclined to refer the eccentricities in form of supernumerary teeth, and of some odontomes.

A remarkable case, reported and figured in Tomes's "Dental Surgery," tends, I think, strongly to support the view I have advanced. A cyst containing twenty-eight or more separate dental formations (some of which were single denticles, while others consisted of an aggre-

gation of these elementary forms) occupied the place of the absent canine, bicuspid, and molar. Some specimens of erratic and excessive dental development I have had here figured (Pl. IV.), that I may direct your attention to them *seriatim* as illustrations of my remarks.

As, however, I find that my paper would extend to most inordinate length if I entered on the discussion of these specimens generally, I will only refer to those that bear on the question of individual denticular development, and leave the consideration of odontomes for another occasion, which I hope may be provided by my friend, Mr. Charles Tomes, giving us the results of his investigations into the nature of a radicular odontome, of which he has recently made a section.

In Plate IV. Fig. 1 represents the simplest and common form of supernumerary ; in fact, a denticle or most elementary tooth-formation. The enamel in such a conical tooth ceases all round the neck at an equal distance from the apex of the crown ; in other words, by a line free from undulations.

Fig. 1A is a smaller denticle of the simplest form.

Fig. 2 (taken from Specimen No. 374 in the museum of the Society) shows an enamel nodule attached to a molar at the point corresponding to the bifurcation of its roots. Mr. Salter has ranked such a nodule among odontomes, and has

shown that it consists of enamel thickly capping a cone of dentine, and is, in reality, a submerged cusp, which to my mind means a denticle developed in an unusual situation, perhaps to be explained by the mutual attraction which enamel and dentine seem to have for one another.

Fig. 3 represents another specimen from the museum (No. 373). In this, apparently, a large cusp of a supernumerary tooth is attached to a molar, at the neck of the latter. The frequency of the occurrence of this junction at the neck of the tooth, or at the bifurcation of the roots, suggests that a cessation of the tooth-sac, as such, at this point, has something to do with such localization.

Fig. 4, also taken from a specimen in the museum, shows a small supernumerary tooth or denticle attached to, and doubtless blended with, a molar.

This gemination of teeth involves a commingling of the dentine of the united teeth; and, looking at this specimen, at the two last-mentioned, and at the next to be noticed, it seems hard to draw a line between them, and to say one is an odontome and the others are geminated teeth: the same remarks may possibly apply to some of the projecting masses which have been called coronary odontomes.

Fig. 5 represents a lower wisdom, with two supernumerary teeth of true bicuspid form blended

with it. It was extracted under chloroform by me, at Guy's, from a man who was suffering from chronic spasm of the masseter, and from local suppurative inflammation set up by this triplet's presence, and its ineffectual attempts at complete eruption. This man had the largest teeth I have ever seen; he was not particularly hirsute. The specimen tells its own formative history.

Fig. 6 shows a two-cusped supernumerary that blends with the lower part of the crown of an upper molar, and then, bending on itself, develops its root in a bold outward curve. Instances of the development and perfect blending of an extra half-cusp on the buccal and lingual surfaces of upper molars are familiar to us all, and also, probably, the flattened form of the small separated Supernumerary sometimes found in these positions. (Specimens shown.) Supplemental teeth, undistinguishable from the normal incisors and canines, are, as we know, developed in the front of the mouth sometimes, and a pair of teeth, called cubic, occasionally behind the incisors.

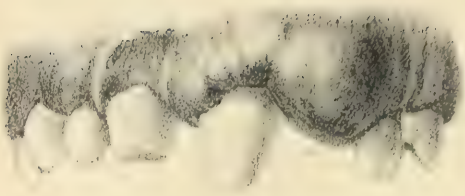
Fig. 7.—The characteristic difference of these so-called cubic teeth from the normal incisors is seen to be a flattening of the labial surface, together with the greater vertical development of the lingual lobes, approximating the masticatory surface to that of a bicuspid; and, remarkably

enough, we sometimes find in them a greater development of the central lingual denticle or cusp, and sometimes of the two lateral ones; thus increasing the likeness, in the one case, to a first, and in the other, to a second lower premolar. The breaking up of these teeth into their elementary forms may account for the numerous separate supernumeraries of simpler form occasionally met with in the incisive region. (Model shown of a case.)

Fig. 7a.—A temporary tooth extracted by myself, showing the T form noticed by Mr. Tomes in writing of the various forms that supernumeraries take, its peculiar form being the result of the abnormal development of its lingual central cusp.

Figs. 8 and 9 are from specimens kindly lent me by my friend Mr. Pedley, of Guy's. They were extracted by Mr. Pedley, senior, and held the place of upper central incisors. The separate denticles forming the crown are in both specimens bundled together without any traceable order, and in one specimen the compound root has spread out into a radicular odontome.

Fig. 10 represents in vertical section a radicular odontome of the simplest kind, produced by a general axial dilatation of the pulp of the root. This case, I believe a unique one, is exactly described by the name of "hypertrophied dilated tooth-fang." An uncalcified pulp occupied the



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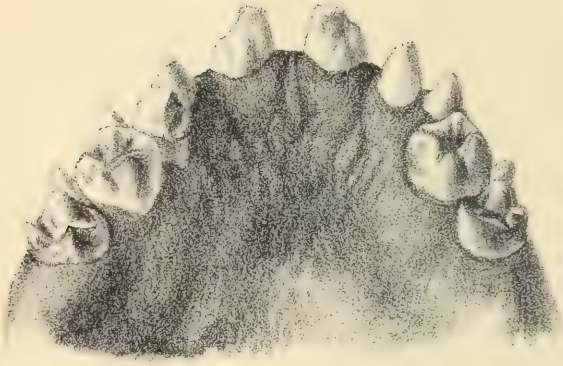

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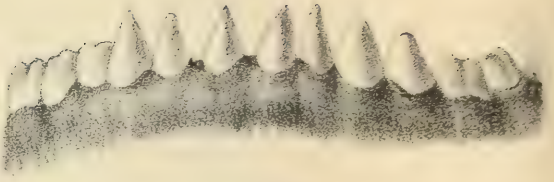

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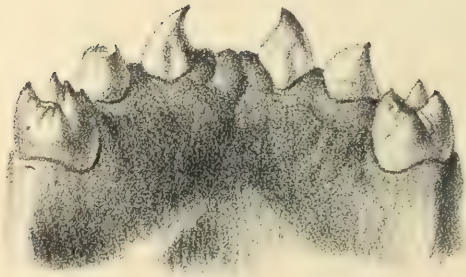

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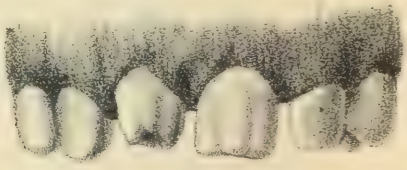

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## PLATE V.

Representing cases referred to in accompanying Paper.

Fig. 1 Shows tumour produced by the hypertrophied dilated tooth-root, shown in fig. 11, Plate IV. The central incisors have crowns of slightly-marked syphilitic form.

Fig. 2 Represents the teeth of E. W., æt. 11.

Figs. 3 and 3a Represent the teeth of R. W., æt. 15; sharp points have been filed off the upper central incisors, and the temporary molars are being succeeded by single-cusped pre-molars.

Fig. 4 Represents the teeth of Thomas B. at the age of nine. A possibility of syphilitic history is attached to this case.

Fig. 5 Represents the upper teeth of C. L. S., æt. 16, and shows one central incisor of perfect form, and the other of typical syphilitic shape. See Paper with reference to teeth of other members of family.

largely-expanded pulp-chamber, which terminated in a very large foramen, protected by a cowl-like projection. The case has been reported by Mr. Salter in the Guy's Hospital Reports for 1876, and I will only very briefly touch on its main features. The Boy, æt. 11, from whose mouth the tooth was removed, came into Guy's under the care of Mr. Bryant. He had for about three years noticed a swelling in the front of the upper jaw, but had suffered no pain from it. The tumour figured in Plate V., fig. 1, was red, soft, and had a slight tendency to bleed. It looked like an epulis; the downward projection of the left central incisor and its separation from the lateral, being however, marked features. The form of the crown of the central incisor led me to suspect inherited syphilis and though no history of it could be obtained from the parents, and the boy presented no other sign, his elder sister had become deaf, and had suffered in sight from inflammation of syphilitic origin.

Before leaving this part of our subject, I would say that perhaps some light may be thrown upon the formation and direction of normal tooth-roots by the theory of tooth architecture advanced, while the singleness of the roots of compound supernumeraries may be partly explained by the fact that they are intruders in the jaw, and, consequently, have stinted accommodation for their implantation.

Figs. 11 and 11a.—The tendency of the dentine and its pulp to break up into smaller dentinal systems under disturbed conditions of development may help to explain also the structure of coronary odontomes. The two small odontomes here figured, represent a lateral incisor and a canine, and gave rise to two distinct dentigerous cysts. They were extracted by Mr. Cooper Forster, at Guy's, from the mouth of a girl æt. 13, and were found by Mr. Salter to consist of enamel dipping down between dentine, as figured by Heider & Wedl in their Atlas.

We now pass to the consideration of some cases in which the teeth present great peculiarity of form, produced by a remarkable development of the central cusp or denticle, and a diminution or suppression of the others.

At the end of last year, my friend Mr. Bell (our late house-surgeon at the Dental Hospital) brought to my notice the case of the child Emma W., æt. 11, a model of whose teeth, taken at that time by Mr. Bell, I hand to you. This child, one of eleven, is of fair complexion; her hair short, fine, and scanty, used to come out. Her eyes, of grey colour, are remarkably small, and the sight of the left eye has been defective from birth. Mr. Hutchinson, who has kindly examined her eyes, will, I hope, tell us what defect he found in them. These more recent

models, taken after the lapse of several months (Pl. V., fig. 2), show an elongation of the central incisors, making their hooked character more apparent. Being informed that the eldest sister of this child had also peculiar teeth, I paid a visit to her mother's house at Harrow, and the following are some of the facts in the family history :— The father, at the age of 36, died last year, it is supposed of consumption. The mother, a tall, good-looking woman, whose remaining teeth (she has lost a good many) show no peculiarity, believes that her late husband's incisor teeth were pointed, and that he only had two upper incisors. Of the eleven children, two have recently died, apparently from phthisis.

The eldest of the family, Ruth W., æt. 15, a well-grown, rather good-looking girl, bears in general features a strong likeness to her sister Emma ; her complexion is fair ; the hair on the scalp is short and rather scanty, but very fine fair hairs are developed on temples and cheeks in more than usual number. Her eyes, of grey colour, used to become bloodshot. The models of her teeth are here (see figs. 3 and 3A, Pl. V.). She has only changed one lower tooth, an incisor. It will be noticed also that the temporary molars are being succeeded by pre-molars in form of a simple (curved) cone. Her central upper incisors had the middle cusp considerably pro-

longed, but just before my seeing her, she had filed it down to a level with the one on the mesial side.

Great dissimilarity exists among the children of this family. The eldest boy, who takes after his mother, is a dark, handsome lad, with a remarkably well-developed set of teeth.

Another sister, Alice, æt. 10, a very small child for her age, is not so fair as, and does not strongly resemble, her elder sisters. As will be seen in this model (model shown) her upper permanent central incisors are slightly abnormal, the central tubercle being represented by two small tubercles, which project beyond the level of the lateral ones. Her temporary upper incisors were pointed; her left eye (the lids, I am not sure about the pupil) is at least a third smaller than the right one, which is small also; her eyes are weak.

On seeing the teeth of these children I was struck with their similarity to those of a boy whom I had seen, between six and seven years ago, at the Islington Dispensary. This is the model of his upper jaw, taken by my friend Mr. Scully, and the following were my notes taken at the time:—

"Thomas B., æt. two years and nine months, an undersized child. Is he the subject of constitutional syphilis? Is hydrocephalic. Fontanelles but just closed. Hair absent for first year. Cut incisors at ten months of age, and molars appeared

six weeks back. No teeth or signs of them in lower jaw. *Family History* :—Mother has been married five or six years. Had first child ten months after marriage. It had the same constitutional taint, was hydrocephalic, and died at sixteen months of age, without teeth."

I have lately succeeded in finding this boy again, and the further facts obtained relative to him and his family are of interest.

Thomas B. had no toe or finger nails at birth. In infancy had snuffles (?), or sniffed in the same way as at present, and was sometimes nearly suffocated. When nine months old he had eczema (?) on scalp, and abscesses at back of head. He has twitchings of facial muscles, and has been threatened with chorea. Mother and neighbours say that he suffers intensely from hot weather, that he does not perspire (another canine characteristic), and that the veins stand out on the temples of his hydrocephalic head alarmingly. He has now on scalp more hair of light chestnut colour, but it is still scanty. No eyebrows, very small eyelashes, and small eyes. (A hard growth—a node —the size of a small cherry, is to be felt at the junction of one of his ribs with its cartilage.) He is now nine years and two months old, and is small for his age. As will be seen by these models (models shown), he has cut four temporary canines, has changed his upper central incisors for two

longer, and yet more recurved and pointed teeth, and his only two molars, which are upper temporary ones, have their more prominent cusps long, pointed, and hooked. (See fig. 4, Pl. V.)

*Family History:*—The father is said to be a healthy man, and to have good teeth. The mother, a small pale woman, with dark brown hair, has her left upper lateral incisor somewhat peculiarly shaped, and conical, has never had right upper lateral; she says, to all appearance truthfully, that she has never had first lower molars, no second bicuspids in either jaw, nor wisdom teeth.

The next child to Thomas, a pretty, dark little girl of eight, has conical lower central incisors, while her one erupted permanent upper central incisor is normal in shape, but has the three tubercles on its cutting edge particularly strongly marked. The next child, a boy, died at sixteen months, and was said to have teeth and hair normal. The next, a boy, was stillborn. The next, a girl, eighteen months old, has teeth normal, and hair curly and plentiful.

In the cases just related, the peculiarity of tooth-form appears referable to a lowered degree in the scale of development, which is shared in by the other dermal appendages. If further investigations as to the cause of these malformations in the case of Thomas B. go to show that they are not in any way due to syphilis, a note-

worthy fact appears for diagnostic purposes; for, in comparing these teeth with such as are more or less pointed through inherited syphilis, it is seen that in the teeth we have been considering the central cusps of the incisors and the prominent cusps of the molars are more pronounced than usual, while in the syphilitic tooth (about to be noticed) we find the exactly opposite condition to prevail.

We now pass to the consideration of the peculiarity in the form of the teeth which is indicative of inherited syphilis, and also to the consideration of the causes which induce the honeycombed condition of tooth-enamel.

It is now about twenty years since Mr. Hutchinson (in papers read before the Pathological Society and before this Society) published his views on the influence exerted by inherited syphilis upon the teeth. Knowing how many able men, who certainly are not accustomed to accept theories in pathology without investigating them, consider Mr. Hutchinson's views, in the main, as established beyond cavil, it was with considerable surprise that I read last year, in a report of a discussion which took place elsewhere (under your presidentship, Sir), that several gentlemen expressed doubts as to the diagnostic value of the tooth-malformation in question. My observations on this subject extend over some twelve years, and include some hundred cases; and although in

some details as to the manner of causation I may differ from the view published by Mr. Hutchinson (before knowledge on tooth-development was advanced as it is at present), yet I must coincide entirely with his general conclusions, and greatly admire the manner in which they were formed from carefully accumulated evidence, gathered, as few could gather it, from exact knowledge of special branches of surgery.

Mr. Coleman, who worked with Mr. Hutchinson in his original investigations, and who, from his connection with a large hospital, has had abundant opportunities of verifying his original opinions, said, on the occasion referred to, that he believed these peculiarly-formed teeth were almost invariably connected with syphilis, "though he fancied he had seen one or two exceptions, viz., in families where the elder children presented no symptoms of the disease at all, whilst the third or fourth child showed the typical teeth, and those subsequently born presented no sign of specific disease." With regard to these doubts, it might be that the elder children were born before their parent contracted syphilis, and that before the birth of the younger ones the disease had expended itself, or, at all events, was in abeyance.

The following instructive case bearing on this point was met with by me at Guy's. These models of it (see fig. 5, Pl. V.) show one upper central incisor to be perfectly well-formed, the

other to be a typical syphilitic tooth; the first molars to be characteristically affected, and the lower incisors narrowed, and showing evidence of obliterated notching. The notes of the case, taken at the time, are as follow:—

"Charles L. S., æt. 16; white, pasty complexion; depressed bridge of nose, had snuffles in infancy, corneitis five months ago. *Family history*:—Six brothers and sisters; next brother, æt. 14, has same complexion as Charles, has no bridge to nose, and suffers from headaches, for which he is attending at Guy's. His teeth are perfect in form. The next brother, æt. 11, has marked syphilitic teeth."

In the discussion alluded to, one surgeon—a high authority on syphilis—is reported to have used words to the effect, that because syphilis produced many symptoms that were also produced by other causes, therefore teeth showing this particular defect could not be held as diagnostic of syphilis.

*Now the question really is this*—Is there one peculiar conformation of the teeth due to inherited syphilis and not produced by any other cause? The evidence in favour of an affirmative answer to this question appears to me so strong that I think the onus of disproof rests with the sceptics. A doubt as to the diagnostic value of these teeth can only be raised by the bringing forward of cases, or the models of cases (showing the typical syphilitic teeth), accompanied by

conclusive evidence of the non-inheritance of syphilis.

I believe that, to a great extent, the doubts which exist on the subject are due to a vagueness of knowledge as to what typical syphilitic teeth are like, and to their being confused with teeth which simply show a defect in enamel, whether produced by mercury or otherwise.

A grave responsibility rests with any one who acts on a half-knowledge in this matter, as mistrust may be unjustifiably sown in families by unwarrantable inquiries; and patients likewise may benefit or suffer in proportion to the thorough knowledge of it possessed by their medical adviser.

A careful study of the plates Mr. Hutchinson has published, or the study of the mouths of patients who have undoubtedly inherited syphilis, will, I believe, establish the following facts, viz.:— That syphilitic teeth are seen in their most typical form, when they have been developed free from the influence of mercury; that in such teeth, the enamel to all appearance is evenly developed over the dentine (in a great many cases it may be less thick than normal over the point of the central lobe in the incisor and absent from a limited area on the masticatory surface of the first molars, but I am not sure mercury has not been administered in such cases). Where the enamel is evenly developed, the tooth is not affected as to colour. As originally observed by Mr. Coleman, the

affected teeth are almost invariably dwarfed, the distal edges of the upper central incisors are turned outwards, and in the front of the mouth the alveolar portion of the upper jaw is deficient in vertical development.

When the upper incisors are of typical form, I believe it is exceedingly rare for the lower incisors to be altogether unaffected, and the first permanent molars are exceedingly prone to be smaller and more dome-shaped than usual (Compare figs. 12 and 13 in Pl. IV.). My impression is, that it will be found that syphilis acquired shortly after birth may confer on the teeth that are later formed than the incisors a characteristic form, while the incisors escape, and that thus the deformity is not necessarily due to heredity.

A remarkably interesting case that my friend Mr. Ackery has taken models and notes of may throw light on this question.

I have not made a section of a well-marked typical syphilitic front tooth, not having met with one that I felt justified in extracting ; but, judging from their external form only, I believe their peculiar shape results from a stunted development of the first-formed portion of dentine,—in other words, a dwarfing of the cusps ; and that the single central notch on their cutting edge is due to a greater diminution in the size of the central lobe than in that of the lateral lobes.

The lesser width of the first-formed part of the

crown, as compared with the later-formed portion, the most distinctive feature of these teeth, is explainable in the same manner.

Two years back Mr. Hutchinson read a paper at the Pathological Society, on "Lamellar Cataract and Imperfect Teeth," and expressed the opinion that the honeycombed condition of the teeth was, in a large number of cases, produced by the administration of mercury in infancy. My observations on the subject did not lead me to the same conclusions until I found that Stedman's powders contained calomel. When I became aware of that fact, the cases I have noticed, both in private and hospital practice, lead me to agree with Mr. Hutchinson that in a large number of cases, mercury (in some form or other) administered in infancy, is the cause of this faulty development of the enamel of the teeth.

Mercury may be a necessary medicine for a child when suffering from some complaints; but it is certainly desirable that the effect it may exert on the teeth should be recognized by us and by the public, if Mr. Hutchinson's views, with which I quite coincide, are borne out by further observation. To, unnecessarily, give teething powders which may ruin the teeth is certainly not desirable.

Various opinions are held as to the cause of this enamel defect. Some regard it simply as a manifestation of depressed nutrition of the

general system at the time of tooth-formation, whether such condition be due to scrofula, or to the exanthemata, or any severe illness. Thrush in infancy is also considered a sufficient cause for its production.

Mr. Bridgeman last year started the theory, founded on the observation of one case, that honeycombing was due to an electro-chemical action on the teeth as they erupted. His views were discussed and answered at the Odonto-Chirurgical Society at Edinburgh.

As my paper has extended to a length much greater than I intended, I will conclude it by saying that it appears to me that syphilis, in its misshapement of the teeth acts, by disturbing the vascular supply of the pulp (and possibly also of the dental sac, as these structures derive their vessels from below), and that mercury expends its harmful force on the enamel, which may derive its nutrition partially from above, from vessels (as I understand Mr. Charles Tomes to say) common to it and to the gum; and that mercury, while it may prevent the development of the syphilitic type of tooth, may in its place produce the defect in enamel-formation.

Gentlemen,—Before taking my seat I must express regret for the crude form in which my ideas have been brought before you. I trust that the discussion which will follow, will more than make up for the shortcomings of the paper read.

## Discussion.

The President thanked Mr. Moon for his carefully-prepared and interesting paper. With regard to Mr. Hutchinson's statements respecting the effects of infantile syphilis on the teeth, no doubt they had been received at first with some hesitation, but the subject had since been so thoroughly worked out and proved by Mr. Hutchinson, that all, with hardly an exception, now admitted the correctness of his views.

Mr. Ackery read notes of the case of a boy, aged 15, then under treatment in the Middlesex Hospital for syphilitic necrosis of the nasal bones, whose teeth exhibited clearly the effects both of syphilis and of mercury. He also presented the additional peculiarity of three supernumerary teeth, two of them situated behind the lower incisors, the third in the median line above, and all well coated with enamel, whilst most of the other teeth were deficient in this respect. The patient was the third of eleven children; the father had suffered from chest complaints, the mother had been very healthy till after the birth of this child. After suckling him for seven months she became very ill, and some time later suffered from a very bad sore throat, for which she was salivated. The child was said to have been healthy till after vaccination, which was performed when he was between three and four months old. He then had a very bad arm, and numerous sores afterwards appeared on various parts of his body. These proved so intractable that his mother at last took him to Mr. Startin, who prescribed mercury freely, both for external and internal use. Under this treatment the sores healed rapidly, but the patient had several relapses, and was under Mr. Startin's care at intervals during the next ten years. The treatment ordered was always mercurial, and was always temporarily successful. Besides the cutaneous eruptions, the patient had several attacks

of interstitial keratitis, and at last, when he was about eight years old, the nasal caries commenced. When last seen he was a stunted boy of miserable aspect, the bridge of his nose had quite disappeared, and he had extensive ulceration of the soft palate. The state of his teeth was as follows :— The permanent incisors were small and honeycombed, the left lower canine was fairly coated with enamel, the others were honeycombed halfway down. The bicuspids were fairly coated with enamel, but their shape was very characteristic of syphilis, the first lower bicuspids especially so. They were rounded, "dome-shaped," and instead of having two cusps, the crown was formed by a ring of enamel with a depression in the centre. The six-year-old molars were small, honeycombed, and three of them were carious, whilst the twelve year-old molars were of normal size and form. Unfortunately, no definite information could be obtained as to the dates at which the teeth were erupted, except that he was late in cutting them, and it was thought that the supernumerary teeth came after the others. Mr. Ackery added, that he had brought forward the case because it appeared to illustrate some of the points which had been touched upon in the paper of the evening, and not with any idea of defending a particular theory.

Mr. Coleman said, that in a paper on "Dental Nomenclature," which would be found in the "Transactions," Mr. Bridgeman, of Norwich, had made some very interesting observations on type teeth, and their compounds. Had Mr. Moon overlooked this? The question, "What was the simplest type of tooth?" was not an easy one to answer. One of the simplest forms which could well be imagined was that which was met with in dermoid cysts; it was conical in shape, had no vascular canal, and was not planted in a socket, but was united directly with the bone. It would be interesting to compare this with the simplest forms which are met with in animals, to trace upwards the appearance of gradually-increasing complexity, and thus to build up the theory which Mr. Moon had touched upon that evening.

Mr. Charles Tomes said there were two points connected with the pathology of the teeth which required to be further elucidated; viz., the effects of syphilis on the teeth, and of mercury on the enamel. It was only lately that any satisfactory investigation into these important questions had become possible; since until about three years ago nothing certain had been known respecting the normal stage of development of the teeth at various early ages, and our knowledge on this point being inexact, there was no foundation on which the pathologist could work.

But in the *Comptes Rendus* for 1874 appeared a most valuable paper by M. Magitot, in which the dimensions of the dentine caps of the teeth at different periods before and after the normal time of birth were most accurately given. As the result of a very large number of observations, M. Magitot found that the amount of calcification present in the teeth of different fœtuses of the same age varied but little; indeed, it was so nearly constant that he suggests that the point might be useful in medico-legal investigations. The dental sacs resist putrefaction for some considerable time; and the author of the paper suggests that it would be possible to tell the age of the fœtus by measurement of the dentine caps, even when all other means of determining its legal viability were destroyed. At all events, we now know accurately the stage of calcification at which the teeth ought to have arrived at the time of birth. There was no calcification in the permanent incisors nor in the canines, but the tips of the first permanent molars were slightly calcified. Supposing now that disease affected the teeth just after birth, the points of the cusps of the first permanent molars would not be affected, but the part below would. And, on the other hand, if the tips were affected we should know that the disease commenced before birth. The dimensions of the temporary teeth were also given in this paper. Calcification was, of course, somewhat more advanced in them; the incisors, for instance, were one-third of an inch long at birth.

His experience of syphilitic teeth did not enable him to say at present what might be learnt from these facts, but, most certainly, they would be a valuable aid to all future inquirers.

In all probability they would enable us to determine something as to the mode of action of the syphilitic poison. If this acted directly by inducing local lesions in contiguous parts, then those parts of the teeth which were being formed at the same time would be affected. But if it acted by some recondite influence, we should expect that it would modify homologous parts of different teeth, irrespective of the time at which they might be formed. The fact that a gumboil connected with a temporary molar would affect the enamel of the succeeding bicuspid, was a proof that the nutrition of a growing tooth might be modified by the direct influence of a local lesion.

Mr. Oakley Coles said that a girl, aged fourteen, the subject of inherited syphilis, had lately been brought to him. She had a node on one tibia, and extensive ulceration of the palate, yet her teeth were perfect, except the upper lateral incisors. The edges of these were good, but below this the enamel was imperfect. He had met with other cases in which syphilitic disease of the palate had occurred in which the teeth were good, and he believed that it was a rule that when the disease affected the palate the teeth escaped.

Mr. Jonathan Hutchinson said that he felt much indebted to Mr. Moon for having given him the opportunity of examining the very interesting patients whose cases he had just read. The teeth were certainly very peculiar, but they did not present the usual characteristics of syphilitic teeth—they were more like the teeth of rats or dogs. So, also, the girl's eyes were very peculiar, but there was nothing in their appearance when examined with the ophthalmoscope which favoured the idea of syphilis. One of the most important aids to the diagnosis of syphilis by means of the ophthalmoscope was the presence of dark patches in the retina; there were none in this case. The eyes were small; one was myopic to a high degree, the other hypermetropic. The appearance of the optic discs was also unusual, indicating optic neuritis at an early period of life, probably before birth.

To come to the general subject. He was glad to see that the teeth were assuming a more important position in pathology than they had done hitherto. He thought it might be taken for granted that the "syphilitic tooth" had been proved to be a fact. He had challenged any one to bring forward a patient with well-marked syphilitic teeth in whose history no evidence of syphilis could be found, but none had come. He thought, however, that he had been mistaken in the explanation which he had at first given of the cause of the deformity: it was not due to stomatitis. The effects of syphilis and of mercurial stomatitis often co-exist in the same patient, but they could be separated. The syphilitic tooth was evidently the result of an arrest of development; the central denticle of the incisor was absent, and the lateral fell together. The enamel was not interfered with by syphilis, but it was always damaged by mercurial stomatitis. Then, again, in the effects of syphilis want of symmetry was common; one tooth might be notched and the next perfect, but stomatitis affected neighbouring teeth more equally. The same want of symmetry was often seen in other syphilitic affections, as keratitis. It was therefore necessary to fall back on what Mr. Tomes had called "some recondite influence"; some unknown influence, acting in all probability through the agency of the nervous system, in order to explain those peculiarities. The fact which Mr. Coles had observed, that when the soft palate was affected the teeth escaped, was true as a rule. Those phagedænic ulcerations had formerly been thought to be strumous, but he now confidently attributed them to syphilis. He might mention as an example the case of a stout, florid, healthy-looking boy, 12 years old, who had been brought to him suffering from sloughing ulceration of the palate; he had then no other evidence of the syphilitic taint. The throat was cured and the boy discharged, but was brought back a short time afterwards with a well-marked attack of syphilitic keratitis. Mr. Moon's observation respecting the shape of the first permanent molars in syphilitic cases had interested him much: he had not himself noticed it.

The question of "mercurial teeth" was also interesting, but more doubtful as yet. Mr. Moon believed in the truth of the

hypothesis; his colleague, Mr. Salter, denied it. The way in which the supposition was arrived at was curious. Lamellar cataract was a disease which affects the eyes of children who have suffered from convulsions; it was noticed that whenever a patient had that form of cataract he had also honeycombed teeth, and it was thought that the convulsions, the cataract, and the honeycombed teeth were all due to the same unknown cause. At last a few exceptions were found—patients with cataract but with good teeth, and then some who had had convulsions only and yet had honeycombed teeth; lastly, it was noticed that most of the patients had been treated with mercury. So it came to be recognized that the honeycombed teeth were only accidentally associated with the cataract, and that they were in fact the result of the mercury which had been given to cure the convulsions. In some cases, when it had been denied that mercury had been given, it had been found that Stedman's powders had been given surreptitiously by the nurse. Although, as he had stated before, it could not be said to be proved that honeycombed teeth were always the result of mercury given in infancy, still all the evidence which had recently been collected went to confirm the truth of the hypothesis.

Ten o'clock having struck, it was proposed by Mr. Charles Tomes and seconded by Mr. Hutchinson that the further discussion of Mr. Moon's paper be adjourned until the next meeting. This was carried.

The PRESIDENT, after according thanks to Mr. Moon and the other gentlemen who had brought forward contributions, then announced that at the next meeting, after the adjourned debate on Mr. Moon's paper, Mr. Hutchinson would read a paper on the "Radical Cure of Alveolar Abscess."

The meeting then adjourned to Monday, the 4th of June.

[We are requested by Dr. Field to state that the electro-magnetic plugger he prefers is that invented by Dr. Webb, and not as otherwise reported in last number of Transactions.—ED. Trans. O. S.]

# GENERAL MONTHLY MEETING,

*June 4th*, 1877.

S. CARTWRIGHT, Esq., President, in the Chair.

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The Minutes of the previous Meeting were read and confirmed.

The following gentlemen were elected Members of the Society :—

Mr. William Taylor Smith, L.D.S., 9, Great Marlborough-street, Resident.

Mr. Frank R. Merson, South Molton, Devon, Non-resident.

Mr. William McOwen, 15, Richmond-terrace, Blackburn, Non-resident.

Mr. Arthur G. Payne, 2, Sussex-place, Southampton, Non-resident.

Mr. Harcourt A. B. Bevers, L.D.S., 46, Broad-street, Oxford, Non-resident.

The following gentlemen having signed the obligation book, were admitted Members of the Society.

Mr. B. E. Manville, Mr. G. H. Harding, and Mr. Joseph Harrison.

The President announced a donation to the Library, "Diseases of the Tongue," by Mr. Fairlie Clark. Presented by the Author.

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Mr. Oakley Coles gave notice that at the next meeting he would propose that a change be made in the mode of conducting the election of members. He would suggest that a sufficient number of ballot-boxes be provided; that as many of these as might be necessary should be placed on the table in the Council-room, with the name of a candidate affixed to each, and that members should give their votes before they came in to attend the meeting.

Mr. Sewill thought that Mr. Coles's notice was not in order, since, according to the rules of the Society, changes in the order of business could not be discussed at an ordinary meeting. Besides, there was already a rule of the Council, according to which all the candidates for membership on one evening might be balloted for collectively. The present waste of time might be at once avoided by acting on the recommendation of the Council (see Transactions for January, 1876, p. 73).

Mr. Coles replied that the present plan of balloting for each candidate separately was the original one, and was in strict accordance with the rules of the Society. The plan of voting for all the candidates who were proposed for election on one evening in a batch, had been tried for a time, but some remarks made by Mr. Underwood, at a recent meeting, had caused the Society to revert to the original mode of conducting the elections.

Mr. Weiss exhibited a supernumerary bicuspid. It resembled the ordinary first bicuspid, to which it was united: the other teeth were well formed. He believed that supernumerary bicuspids were rarely met with: he had not been able to find a specimen in the Museum. A curious point in connection with this case was, that the patient's father had a similar tooth.

Mr. COLEMAN said that supernumerary bicuspids were certainly rare, but he knew that at least one example had been previously shown to the Society. He remembered the gentleman who exhibited it, quoting Dr. Darwin as an authority for saying that apes had three bicuspids, and suggesting that the occasional appearance of an extra bicuspid in man might be looked upon as a partial reversion to our former quadrumanous state.

The PRESIDENT then called upon Mr. Moon to open the adjourned discussion on his paper.

Mr. MOON said that Mr. S. Hutchinson having kindly waived his right of opening the discussion that evening, he was glad to have the opportunity of saying a few words before it commenced, and of answering the question which Mr. Coleman had put to him at the last meeting, as to whether he had seen a paper on "Dental Nomenclature," which had been read before the Society by Mr. Bridgeman. He had not then read the paper in question, though he had done so since, or he should have been glad to have availed himself of Mr. Bridgeman's carefully worked out ideas, and to have acknowledged his obligation to the author. He was obliged to Mr. Coleman for having drawn his attention to the subject. As Mr. Bridgeman observed, the three-lobed form seen in the incisor was modified in the canine by the greater prominence given to the central lobe; in the bicuspids two of these triplets were developed, facing in opposite directions, whilst the molars presented a form which would result from the blending of the two bicuspids.

On the question of the separate development of individual denticles, Mr. Bridgeman remarked that "the eminence of the dentinal matrix, growing on in a detached state, formed the pin tooth,"—*i.e.*, as he supposed, a simple conical denticle.

In his own paper he had laid stress on the tendency of individual denticles to be modified, and to assert a partial or complete autonomy, as evidenced by supernumerary cusps, by supernumerary teeth, by the sharp-pointed teeth of the

children whose cases he had brought forward, and by typical syphilitic teeth. He also suggested that some odontomes might probably be considered to be due to the misdevelopment of a supernumerary in union with a normal tooth-pulp, rather than as an outgrowth from the latter. Also that the tendency of the dentinal pulps to break up into smaller dentinal systems might account for the arrangement of the enamel and dentine seen in coronary odontomes in which it attained its climax.

He was daily strengthened in the belief, that in some people (probably of a particular diathesis, and possibly the subject of peculiar conditions of the eyes), it would be found that the even surface with which the dentine was credited, was replaced by a surface presenting fine processes which interdigitated with processes of enamel. He should like to ask Mr. Charles Tomes if he had observed anything of the kind, and if so, whether he did not consider that it might account for the hitherto unexplained presence of dentinal tubuli amidst the enamel? He should also be glad if Mr. Coleman would tell him whether he agreed with the opinion he had expressed, that the typical syphilitic tooth was of normal colour when the enamel was not defective? Lastly, there was the question as to the causes which produced the honeycombed condition of the enamel. Such were some of the remaining points in his paper which he should be glad to hear discussed, and either upheld or demolished as they might deserve.

The PRESIDENT then invited the members present to resume the discussion of Mr. Moon's very able paper, some of the chief points of which had just been recapitulated. He hoped that all would express their opinions freely, however these might vary. The truth could only be learnt by studying a subject from various points of view, and real agreement could only be arrived at by the free expression of opinion on all sides, and by a candid confession of difficulties. He made these observations because he thought he had sometimes noticed a tendency on the part of speakers, either from an unwillingness to express opinions at variance with those of the majority, or from a fear, which he felt sure was groundless, of

hurting the feelings of the author of the paper, to dwell upon points of agreement, and to pass over those which might be controverted. He thought that this was a pity, and that it was likely to defeat one of the main objects of their debates.

The point which raised most doubt in his mind was the alleged disastrous effect of mercury on children's teeth. Mercury had formerly been given both to children and adults much more freely than was now the fashion, yet honeycombed teeth were probably more common now than they were then. It was well known that children would take large quantities of mercury without any effect being produced on the mouth; but they were very liable, especially if hand-fed or naturally delicate, to other forms of stomatitis. These local inflammations would, he thought, be very likely to interfere with the nutrition of the growing teeth, and he felt much more disposed to assign the frequent occurrence of honeycombed teeth to this cause, rather than to mercury. At the same time, though he did not believe that mercury given as an occasional purge could leave any permanent ill effects, he thought it possible that when given in small doses, frequently repeated, it might do harm to the teeth by lowering the child's health, and thus favouring the occurrence of the local ailments to which he had referred.

Mr. Charles Tomes said that Mr. Moon had appealed to him for an explanation of the way in which the penetration of dentine tubes into the enamel was produced which was found in the teeth of the marsupials and of a few fish. He was sorry he could not enlighten him: we did know something about the development of the dentine and something about the mode of formation of the enamel, but how it came to pass that in these rare instances dentinal tubuli were found penetrating the enamel, was altogether a mystery. He had been trying for a long time to get a young kangaroo in order to investigate this point, but had not, as yet, been able to obtain one suitable for his purpose.

He should like to say a few words about Mr. Moon's theory

of "denticles." Because the apices of the incisors nominally showed three points, Mr. Moon supposed these teeth to be composed of three denticles. No doubt the incisors were formed from at least three centres of calcification—he thought probably from four; but was Mr. Moon justified in speaking of these as three individualities forming one tooth? As to the case he had mentioned of the very translucent incisor in which the dentine could be seen through the enamel rising up into three points, he did not look upon that as showing a natural tendency to a tripartite division, but as evidence of a distinctly pathological fact, viz., that the growth of the dentine had not proceeded as evenly as it should have done. In the molars calcification began on the four cusps, and these four centres should join evenly to form a perfect crown; but sometimes calcification did not go on thus regularly, and then, instead of level and invisible join, a little pit or sulcus was left. This was what had occurred in this incisor, the areas of calcification had not joined as perfectly as they should have done. Supernumerary teeth were, no doubt, often due to a further step in the same direction, viz., to complete absence of union between neighbouring centres of calcification.

Then, again, he did not think that Mr. Moon's theory was in accordance with the teaching of comparative anatomy. The teeth of the insectivora, for instance, were composed of numerous cusps, the number and arrangement of which differed in each genus. Now on one of these teeth you might find four distinct cusps, and, besides these, near the margin of the gum, you would find a basal ridge. But in other genera this basal ridge became more elevated, and then divided into cusps. Were we then to suppose that the apparently simpler tooth was really composed of eight or ten denticles, but that some of these were undeveloped, or was it not better to look upon both as being varieties of one form of tooth without descending to the consideration of imaginary units? With regard to "mercurial teeth," he would not express any opinion further than to say that he thought it was scarcely fair to oppose mere general impressions to Mr. Moon's carefully conducted investigations. If any one could bring forward an

equal number of cases of honeycombed teeth in which it could be proved that no mercury had been given, well and good; though even that would not be worth much by itself, since he did not understand Mr. Moon to say that mercury was the only cause of honeycombed teeth, but that it was the most frequent cause.

Mr. S. Hutchinson said he had often noticed the trilobed shape of the incisors which Mr. Moon had spoken of. He had met with a good example lately in a patient with cleft palate, in whom the edges of the lower incisors, which had no teeth opposed to them in the upper jaw, and were therefore not at all worn, showed the two notches very plainly. Still he could not altogether acquiesce in the denticle theory. He thought that if an incisor or canine was made up of three denticles, there would be some indication of this in the shape of the pulp-cavity. Now the pulp-cavity of an incisor was circular, and that of the canines elliptical, and he thought that these regular shapes were rather opposed to the theory of the composite nature of the teeth in question.

While on this subject he would take the opportunity of asking for an explanation of a statement made in the course of the last debate. Mr. Coleman had stated that the rudimentary teeth found in dentigerous cysts had no pulp-cavity. Did he therefore suppose that they grew as mere excrescences from the bone, or did he not think it probable that they grew from a pulp in the same way as ordinary teeth, but that the pulp-cavity had afterwards become obliterated?

With regard to the effects of syphilis on the teeth. As Mr. Moon had enjoyed unusual opportunities of studying the question, he should like to ask him if he could give any reason why the central incisors should be specially affected? And also whether he thought that the period at which the syphilitic contagion had been communicated made any difference in the consequent lesions? Whether, for example, he had noticed any difference between the teeth of children who were congenitally syphilitic and those who had become infected later—as by vaccination?

He had met with a good example lately of the so-called "mercurial" teeth. A child had been brought to him in whom all the temporary teeth were badly honeycombed, the central incisors especially being almost destitute of enamel. The friends informed him that the child had suffered from convulsions when a month old, and had been freely treated with mercury. Still, with two such authorities as Messrs. Moon and Salter arrayed on opposite sides, it was difficult to decide which was in the right. He did not yet feel quite convinced that the mercury was solely to blame: might not the disturbance of the nervous system, of which the convulsions were a sign, have something to do with the defective enamel-formation?

Mr. Oakley Coles said that a child had been brought to him whose peg-shaped temporary teeth were very characteristic of syphilis. Syphilitic deformity of the *temporary* teeth was very rare, and he thought probably for the reason that in most instances the mother was originally healthy, but was contaminated by the father, perhaps after impregnation had taken place. In this case the child's mother had long been the subject of syphilis, and he thought it would probably be found that the extent to which the teeth were affected would vary according to the date at which the disease was communicated, and that in some cases this might be useful for medico-legal purposes, when it was desirable to ascertain whether the syphilitic taint had descended from the father or the mother.

Mr. Coleman remarked that the case which Mr. Coles had just referred to was a very remarkable and important one, since he believed that Mr. Jonathan Hutchinson had never, in the whole course of his inquiries into the subject, met with an instance in which the temporary teeth were affected by syphilis. He hoped, therefore, that Mr. Coles would take an early opportunity of bringing the full particulars of the case before the Society.

In answer to the question addressed to him by Mr. Moon, he should say that his opinion still was that the enamel in syphilitic cases was generally rather translucent, and had a

slightly yellowish tinge,—like size as seen in the oilshops; but this only applied to bad cases; in slight cases it was not noticeable. He did not mean to assert that there was really any alteration in the enamel. Just as a change in the colour of the enamel was one of the earliest signs of caries, so also that caused by the syphilitic poison might likewise be due to some alteration in the structure of the subjacent dentine.

What he had said regarding the teeth found in dentigerous cysts was, that *some* had no pulp-cavity, and he thought that Mr. Hutchinson's explanation of the fact might very probably be the correct one.

Dr. Langmore thought that a mercurial purge was sometimes of great use in the treatment of children's ailments, if given with judgment; but he was equally convinced that great harm was often done by the teething powders which had been so frequently referred to during the discussion. He thought their injurious effects were due, in the first place, to the fact that the powders were primarily sedative, and not purgative. They contained, besides calomel, a very sensible amount of morphia, and the first effect on the child was to make him sleep for some hours: it was only after the narcotism had gone off that the bowels acted, and sometimes they did not act at all. Instead, therefore, of the merely local effects of a calomel purge, there could be little doubt that a part, at least, of the mercury thus given was absorbed, and acted widely on the system. Then again, on account of their sedative effect, the powders were often given much too frequently.

The President then called upon Mr. Moon for his reply to the criticisms which had been passed on his paper.

Mr. Moon said that as it was already late, and there was other business to follow, he would reply as briefly as possible to the expressions of opinion which his Paper had evoked.

After their President's remarks, and Mr. Jonathan Hutchinson's speech, which they had the pleasure of hearing at their last meeting, it was unnecessary for him to say anything

further on the diagnostic value of the syphilitic tooth, and the manner in which its peculiar form was produced.

To Mr. C. Tomes they were indebted for directing their attention to the data furnished by M. Magitot, as to the time at which calcification commenced in the various teeth, and also for his suggestion as to the application of such data in elucidating the causes which produced dental malformations. As regarded honeycombing of the teeth, it appeared that the pitted grooving occurred on such parts of different teeth as were in process of development at the same time. In syphilitic teeth apparently the homologous parts of the teeth were acted on, inasmuch as the points, or first-formed portions of the cusps, were especially affected; however, on this point he was not at present prepared to say whether a continued dwarfing of the whole crown, in the case of central incisors and first molars, might not be observable in those cases in which the cusps of later-formed teeth were also affected through inherited syphilis.

In reply to Mr. Hutchinson's query as to why the central incisors were especially affected, he should say because they, with the first molars and lower incisors, were the first-formed teeth. The question of heredity, and the probable effects which syphilis, acquired shortly after birth, might produce on the teeth, he had touched upon in his Paper. With regard to the denticle theory in tooth-formation, Mr. Coleman had alluded to the simple form of the teeth which had been found in dermoid cysts, and the description and figures which he gave of them showed that they consisted of small and simple dentinal systems, in which the pulp had been obliterated by centripetal calcification; their likeness to the small dentinal systems which are seen in coronary and "diffused" odontomes, seemed to him apparent.

He entirely agreed with Mr. Tomes (and thought he had clearly expressed the opinion in his Paper), that the independent development or partial separation of denticles must be regarded as a pathological condition (which he should look to find accounted for by some distinctness in their original

vascular supply). He thought that the fact that the shape of the pulp-cavity in well-formed teeth gave no indication of separate denticular development, was sufficiently accounted for by the but slight irregularity of contour presented by the pulps of such teeth, and by the fact that the unbroken layer of odontoblast-cells would naturally develop dentine centripetally to a common pulp-chamber. He would point out that in treating of this subject, the words "tooth structure" had been avoided, and that in Mr. Bridgeman's Paper, "sculptural design," and in his own, "the architecture of the teeth," had been the expressions used.

Looking to comparative anatomy, he thought he had some authority on his side. Without descending with Mr. Tomes to the Insectivora, it would be remembered that Professor Rolleston, in a paper read before their Society, had described and figured the molar of the elephant in process of development, and had shown that processes of dentinal pulp were in various stages of formation and development, while other dentinal systems of this compound tooth were in use, and being worn away; and yet, as we are aware, ultimately there would be a mergence of the dentine, and the formation of a common pulp-chamber in this molar.

The explanation he had suggested for Mr. Tomes's acceptance with regard to the presence of dentinal tubuli in enamel, had reference to the rare instances in which they had been observed in human teeth. Only on that day the upper central incisors of one of his patients had afforded him a striking example of many sharp spinous processes of dentine interdigitating with enamel, which latter presented a transparent bluish tint, from the absence of intervening opaque dentine.

With regard to the honeycombed condition of enamel, he could only say that his investigations for some time past had been carried out carefully, and on a uniform plan. In getting the history of cases he had avoided putting leading questions, but in inquiring as to the patient's condition in infancy and childhood, he had asked whether there had been thrush, or any form of stomatitis, any general ailment, convulsions, or

disturbances of circulation, as from hooping-cough, &c.? Either of the exanthemata? What medical treatment had been pursued? And what domestic remedies had been administered? The result of such inquiries was, that in a large number of cases no apparent cause but mercury in some form (and oftenest in the form of Stedman's powders) was traceable. He would relate the cases of three children of one family, models of whose teeth were before them.

Isabel B., æt. 13, presents the following condition of teeth :— One upper central incisor has a small circular pit in its enamel, about two-thirds from its cutting edge, and two of her canines show two similar pits apiece, about one-third from their apices. There is a history of enteritis at two months of age, of measles at three years of age, with scarlet fever after. Stedman's powders were first given to her when she was eight or nine months old. John E. B., æt. 10, presents the following condition of teeth :—Enamel defective, or nearly absent (except from the tips of the cusps) from masticatory surface, and halfway up the sides of the first permanent molars, and from two-thirds of the upper central incisors, also from the first calcified portion of the lower incisors and canines. In this case there is the history of severe thrush in infancy, but of good general health. At three months of age Stedman's powders began to be given (about two in a fortnight), and were continued till about the fifth year. Florence B., æt. 7, has enamel absent from masticatory surface (tips of cusps included), and from upper third of the sides of her first molars. As an infant she neither had thrush, nor either of the exanthemata. She had hooping-cough at five, and measles at six years of age. She began to take Stedman's powders at a month old, and continued to take them frequently.

Mr. Hutchinson had not, he believed, expressed the opinion that mercury was the sole cause of honeycombing of the enamel, and his own inquiries did not lead him to the belief that it was so. Again, he had seen a patient who had taken large quantities of Stedman's powders when young, and who had teeth without enamel defect, and doubtless other such

cases would be forthcoming, as mercury affected some constitutions so much more than others.

When mercury had been taken and honeycombing was present, there was no history of the gums having been affected, but he imagined that a quite unappreciable amount of stomatitis might affect the formative organ of the enamel; and, moreover, it did not seem to him beyond the bounds of possibility, that the nutrition of the forming enamel might be disturbed by the frequent administration of mercury, irrespective of any local congestion being produced by it.

Mr. Hutchinson having originally pointed out that some of the popular teething powders contained mercury, he was led to inquire into the composition of Stedman's powders, and the analysis, with which his colleague Dr. Stevenson had kindly furnished him, showed that calomel and morphia were contained in them.

The suggestion made during the discussion by Dr. Langmore, that the injurious effect of such powders on the teeth might be due to the fact that their action was primarily sedative, and consequently that their contained mercury, being retained in the system, was more liable to be absorbed, seemed to him particularly worthy of consideration.

The PRESIDENT then invited Mr. S. Hutchinson to open the discussion on the treatment of alveolar abscess.

Mr. HUTCHINSON replied that the usual time for closing the meeting had already arrived, and it could only be prolonged for another half-hour by the vote of the majority of the members present; he must therefore leave it to them to decide what should be done. It had been announced in the last number of the "Transactions" that he would read a paper on the "Radical Cure of Alveolar Abscess": he had not written a paper, he had only jotted a few observations on the subject of alveolar abscess, more especially in relation to a method of treatment which had been very successful in his hands, and of which he wished to hear the opinion of other members of the Society. If they wished, he was willing to open the discussion, but he thought that it would scarcely be possible to bring it to

any satisfactory conclusion within the limited time at their command that evening. He thought that the remaining half-hour might be better occupied in the inspection of the collection of models of syphilitic and other malformations of the teeth which had been brought by Mr. Moon, Mr. Coles, and others. If the Society wished, he would be quite willing to arrange his observations on alveolar abscess more carefully, and to read a paper on the subject early in the following session.

The PRESIDENT said he agreed with Mr. Hutchinson, that they would scarcely be able to do justice to the subject at that late hour. He would therefore accept with pleasure Mr. Hutchinson's kind offer to read a paper early in the next session.

The thanks of the Society having been voted to Mr. Fairlie Clark, Mr. Weiss, Mr. Moon, &c., the meeting adjourned until the first Monday in November.

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The Curator begs to acknowledge the following donations to the Museum, which came to hand too late to be presented at the June meeting of the Society :—

Presented by D. R. Eden, Esq., Brisbane, Australia :

Portion of lower jaw of Diprotodon.
Skulls of Macropus major.
Onychogalea———?
Bettongia Ogilbyi.
Phalangista vulpina.
Phalangista lanuginosa.
Perameles nasuta.
Phalangista———?

Presented by A. W. Whittingham, Esq., Hanley,

Two malformed temporary incisors.

Presented by — Mahon, Esq., Aspley,

A dilacerated incisor.

# INDEX.

Abscess, alveolar, as dependent on diseased teeth, 7. See also "Alveolar Abscess."
Ackery, Mr., on syphilitic effects upon the teeth, 244.
Address, inaugural, of the President (Mr. S. Cartwright), 97.
Address of the President (Mr. Chas. Vasey), on retirement, 74.
Alveolar abscess: its prevalence, 7; importance of the subject, 8; its two varieties, ib.; connection with gum-boil (or gum "bile") 8; its cause and mode of origin, 9; as described by Hunter, ib.; as described by Fox, 10; its relation to the formation of pus, ib.; as described by Tomes, ib.; as described by Bell, 11; and dental caries, 12; as described by Salter, ib.; its connection with caries, 12; absence of pain in its formation, 13; its situation at period of opening, 13; how discharge from the nostril is caused by it, 15; its effects in swellings in the neck, 16; in abscess in the lower jaw, 18; its resemblance to scrofula, ib.; as productive of injuries to the sight, 21; to amaurosis, 22; its general treatment, 25.
Amaurosis, consequent on acute disease of the antrum, 22.
Annual general meeting of the Society, 67.
Antrum, abscess of the, caused by decayed teeth, 16.
Arkövy, Dr. (Buda-Pesth): on the development of dentine, 103, 128; nominated for non-resident membership, 131; elected, 217.
Arsenic as a remedy for suppuration of the pulp, 60.
Artificial teeth: cases where swallowed or impacted in the pharynx, 135; where removed from pharynx, œsophagus, or stomach by forceps, 136; where the knife has had to be used, 149; where they have been passed by the patient, or ejected, 159; where death has ensued, 168; where they have been forced into the stomach, 169; general summary of results, ib.
Ash, the late Mr., value of his invention of artificial mineral teeth, 5.
Attfield, Prof., on the innocuous

nature of red dental vulcanite, 208.
Auditors, appointment of, 41.

B.

Balkwill, Mr.: on irregularity of the teeth, 51, 52; on the treatment of exposed pulp, 64.
Barham, Dr., his advantages conferred on the profession, by the invention of the rubber-dam, 201.
Barrett, Mr. Ashley: on cases where artificial teeth have been swallowed, 47, 49; on devitalisation of the pulp, 62; on a new three-sided drill, 101; on the dentinal tubes, 127; on nitrous acid, 189; on the exclusion of saliva during operations, 197.
Barrett, Mr. H. J., elected councillor, 73.
Bell, Mr. Royes: on gum boil or "bile," 11; report on certain cases where artificial teeth have been swallowed, 45.
Bell, Mr. M. L. (Canterbury), nominated for non-resident membership, 217.
Bevers, Mr. H. A. (Oxford), nominated for non-resident membership, 181; elected, 251.
Blackstone, Mr. Joseph, on a case of swallowed teeth, 43.
Blaise, Mr., exhibits an actual cautery, 42.
Bridgman, Mr. F. G., elected councillor, 73.
Bromley, Mr. E. H. (Southampton), elected non-resident councillor, 73.
Brownlie, Mr. J. B. (Glasgow), nominated for non-resident membership, 67; elected, 97.
Bruce, Mr. (Valparaiso), his specimens of old mineral teeth, 3.
Buchanan, Mr. G. W., elected vice-president, 73.
Bruce, Mr. Pedro, nominated for non-resident membership, 1; elected, 67.

C.

Calcification, 124.
Camphoric ether as an anæsthetic, 101.
Campion, Mr. H., elected vice-president, 73.
Canton, Mr. Alfred: resignation as ordinary member, 1; nominated honorary member, ib.; elected, 67.
Carbolic acid in suppuration of the pulp, 57.
Caries, and alveolar abscess, 12; Neumann's observations on, 109.
Carteigh, Mr. John C., jun., elected resident-member, 41.
Cartwright, Mr. S.: on the position and prospects of the Odontological Society, 98; on the new association, 99; on the advantage of the institution of the Dental licentiateship by the College of Surgeons, 99; on curing alveolar abscess by injection of creosote, 100; on artificial teeth swallowed, 176; on the report of the committee on coloured vulcanite, 218; on infantile syphilis, and its effects on the teeth, 244; on the alleged disastrous effects of mercury on children's teeth, 254; his election as president, 73, 77.
Cautery, actual, new form of, 42.
Chairman's address, 74.

Chisel for the pneumatic mallet, new, 68.
Coffer-dam, advantages of the, 124.
Coleman, Mr.: on india-rubber rings, 3; on the use of rubber-dam, 4; on abscesses consequent on decayed teeth, 31; on the dentinal tubes, 127; on a recent death from the inhalation of nitrous oxide gas, 188; on the exclusion of saliva during operations, 200; on the report of the committee on coloured vulcanite, 218; on the appearance of typical teeth, 245; on supernumerary bicuspids, 253; on syphilitic effects upon the teeth, 258; elected councillor, 73.
Coles, Mr. Oakley: on the use of rubber in cases of irregularity of the teeth, 52; on an arrangement for employing enamel chisels in connection with Kirby's pneumatic mallet, 68; on the new preparation called Vaseline, 70; on Stent's modelling material, 70; on an abnormally large canine tooth, 101; on a new application of the spray producer, 132; on a death from inhalation of nitrous oxide gas, 185; on a new india-rubber saliva bag, 217; on infantile syphilis, and its effects on the teeth, 247; proposition as to change in the mode of conducting the election of members, 252; on syphilitic deformities of the teeth, 258; elected honorary secretary, 73.
Coloured vulcanite, supposed instances of mercurial poisoning resulting from, 203.
Conservative treatment, the, in odontology, 79.
Councillors, election of, 73.
Corbett, Mr. D., elected vice-president, 73.
Corbyn's spray-producer, a new application of, in dentistry, 132.
Crowns of teeth, treatment of, 55.
Curator of the Society's Museum, election of, 73.
Cysts in connection with defective teeth, 26.

D.

Death, recent, from inhalation of nitrous oxide gas, 219.
Deaths of members, 87.
Defective form of teeth, 225.
Deficient size of teeth, 225.
De Lessert, Mr. C. G. (Wolverhampton), elected non-resident councillor, 73.
Dennant, Mr. J.: on modelling materials, 71; on cases of artificial teeth being swallowed, 177; elected non-resident councillor, 73.
Dental Hospital, its work during the year, 80.
Dental Society, new, formation of the, 74.
Dentinal fibrils, 106.
Dentinal tubes, 107.
Dentinal tubuli in enamel, 261.
Dentition, remarkable cases of abnormal (Mr. Hutchinson's), 2.
Development of dentine, 103; odontoblasts, 104, 114; dentinal fibrils, 106; dentinal tubes, 107; intertubular substance, 110; calcification, 124; of the teeth, irregular and defective, 223; formation of supernumerary teeth, 224; vagaries of formation resulting in deficient size or defective form, 225; peculiarities due to inherited syphilis, 237; honeycombing, 243; discussion

on the effects of mercury, 256.
Devitalization of the pulp, 62.
Discussions: on alveolar abscess dependent on diseased teeth, 28; on treatment and extraction of the tooth pulp, 61; on the development of dentine, 126; on cases where artificial teeth have been swallowed, 176; on exclusion of saliva during operations, 200; on defective and irregular tooth development, 244; on the effects of mercury on the teeth of children, 256.
Donations to Library: by Mr. Petty, of Wardroper, on the pernicious practice of tooth-drawing; of Snell's Practical Guide to Operations on the Teeth, 131; by Mr. A. Hill on Reform in the Dental profession, 131; by Mr. Fairlie Clark, of his work on Diseases of the Tongue, 252.
Donations to Museum: by Mr. O'Meara (Simla) of the skull of a bear from Thibet; the head of a monkey with peculiar development of the canine teeth; the head of a cheetah with the skin preserved, 101; by Mr. D. R. Eden, of the lower jaw of the Diprotodon; skulls of Macropus major; onychogalea —; Bettongia Ogilbyi; Phalangista vulpina; Phalangista lanuginosa; Perameles nasuta; Phalangista, —, 264; by Mr. A. W. Whittingham, of two malformed temporary incisors, ib.; by Mr. Mahon, of a dilacerated incisor, ib.
Drill: new three-sided, for use with the burr engine, 101; new form of, by Mr. McAdam, of Hereford, 3.
Dublin, state of the dental profession in, 81.

E.

Eden, Mr. D. R., donations to the Museum, 264.
Election of officers and council, 73.
Elephant's molar, effects of an injury to by a rifle-ball, 89.
Enamel, effects of mercury on the, 246.
Extraction and stopping: unreasonable frequency of the former as compared with the latter, 80; in alveolar abscess, Mr. Moon on, 29; of pulp, 55.
Eye, protrusion of and injury to, consequent on an alveolar abscess, 20.

F.

Fastening, within sight of the front teeth, new method of, 1.
Field, Dr., on the extraction of the nerve pulp, 65; two new electric mallets, 192; on the exclusion of saliva during operations, 200.
Finances, statement of, 86.
Finlayson, Mr. (Leith), elected non-resident member, 42.
Fothergill, Mr., on models of a regulating case, 2; on a case of irregularity, 5.
Fox, Mr., on alveolar abscess, 10.

G.

Gaddes, Mr.: on the causes of alveolar abscess opening externally, 33; on a malformed upper molar, 53; on the development of dentine, 127.

Gum-"bile," or boil, 8, 10.

H.

HARDING, Mr. M., nominated for membership, 97; elected, 181; admitted, 251.

Harrison, Mr. Joseph (Sheffield), nominated for non-resident membership, 67; elected, 131; admitted, 251.

Hatfield, Mr., appointed as auditor, 41.

Hepburn, Mr., junr., on the importance of cases of alveolar abscess, 37.

Hill, Mr., donation to Library by, 131.

Honeycombing of the teeth and its causes, 243; how far consequent on the use of mercury, 256.

Honorary Secretaries, election of, 73.

Hunt, Mr.: on a case of swallowed teeth, 49; on cases of irregularity, 51; on carbolic acid in suppuration of the pulp, 62; on sudden deaths from anæsthetics, 188; on a new pneumatic mallet and dental engine, 190.

Hunter on alveolar abscess, 9.

Hutchinson, Mr.: on some curious cases of dentition, 2; on india-rubber rings and tubing, 3; the treatment of irregularity, 50; on arsenious acid in treatment of exposed pulp, 62; on foreign bodies in the larynx, 177; on the trilobed shape of certain incisors, 257; on an example of the so-called "mercurial" teeth, 258; on the treatment of alveolar abscess, 263.

Hutchinson, Mr. Jonathan, on syphilitic types of teeth, 247.

I.

ILLUSTRATIONS, of a group of isolated and preserved odontoblasts, 114; with later dentinal cells, 117; of a set of teeth with gold palate plate and other fittings which had been swallowed, 138; of a plate which had been swallowed, 140; of an impacted denture in the pharynx, 145; of a gold plate with mineral teeth and clasps impacted in the pharynx, 147; of a tooth plate removed from the pharynx, 150; of six artificial teeth on plate that were swallowed and passed, 161; of two artificial teeth on gold plate in the œsophagus and stomach, 165; artificial teeth swallowed and passed by the patient, 169.

India-rubber rings, the use of in treatment of irregularity, 3.

Infantile syphilis, its effects on the teeth, 237; discussion on, 258.

Inflammation of the pulp, 57.

Intertubular substance, development of, 110.

Irregular and defective development of the teeth, 223.

Irregularity: Mr. Fothergill's case of, 5; Mr. Mason's case, 6; Mr. Hutchinson on the treatment of, 50; use of india-rubber rings in cases of, 3, 4.

J.

JAW, lower: abscess in, caused by alveolar abscess, 18; enlargement of caused by alveolar abscess, 24.

K.

KEELING, Mr. Geo. R. (Epsom),

nominated for non-resident membership, 97; elected, 181.
Kingsley, Dr. Norman (New York), his method of treating irregularities, 3.
Kirby, Mr. S. A. (Bedford), elected non-resident councillor, 73.
Kirby's pneumatic mallet, a new chisel for, 68.

L.

Langmore, Dr.: on a case of artificial teeth being swallowed, 177; on mercurial purge in children's ailments, 259.
Levason, Mr. A. G. (Hereford), nominated for non-resident membership, 217.
Librarian, election of, 73.
Library: Report of the librarian (Mr. Rogers), 68; donations to, by Mr. Petty, 131; by Mr. Clark, 252; by Mr. Hill, 131.
Lipscombe, Mr. (Kilmarnock), nominated for non-resident membership, 67; elected, 97.
Longhurst, Mr. H. B., elected councillor, 73.

M.

Macgreggor, Mr. M. (Edinburgh), elected non-resident member, 42.
Macleod, Mr. W. B. (Edinburgh), elected non-resident member, 42.
Mahon, Mr., donation to Museum of a dilacerated incisor, 264.
Mallet and dental engine, new, 190; electric, new, 191.
Mallet, Mr. Gilbert, admitted to membership, 1.
Manville, Mr. Benj. E., nominated for resident membership, 131; elected, 217; admitted, 251.
Margetson, Mr. W. (Dewsbury), elected non-resident councillor, 73.
Mason, Mr. Brown, on a case of irregularity, 6.
Mason, Mr. H. B. (Exeter), nominated for non-resident membership, 67; elected, 97.
Matthew, Mr. C. (Edinburgh), elected non-resident member, 42.
McAdam, Mr., new drill invented by, 3.
McOwen, Mr. W. (Blackburn), nominated for non-resident membership, 181; elected, 251.
Meetings of the Society, annual, 67; monthly general, 1, 41, 97, 131, 181, 217.
Members: deaths of, 87; elected during the year, statement of, ib.; new, nominated and elected, ib.
Mercurial teeth, discussion on the diagnosis of, 256.
Mercury, effects of on the enamel, 246; in children, 257.
Merson, Mr. F. R. (South Molton), nominated for non-resident membership, 187; elected, 251.
Mills, Mr., on a death from inhalation of nitrous oxide gas, 185.
Mineral teeth, specimens of old, 3, 5.
Moon, Mr.: on the treatment of irregularity, 4; on alveolar abscess, 28; on Salter's views as to alveolar abscess, 42; on a new method of actual cautery, 43; on a peculiar mal-formation in an upper molar, 53 on disturbance of vision consequent on defective teeth, 61; on the development of irregular and defective teeth, 223; on the ten-

dency of individual denticles to assert autonomy, 253; reply to some criticism on his paper, 259; on the use of Stedman's soothing powders, 262.
Moore, Mr.: on camphoric ether as an anæsthetic, 101; on the development of dentine, 126.
Morrison engine adapted to a pneumatic mallet, 190.
Mummery, Mr., on a death from nitrous oxide gas, 186.
Museum, donations to: of the skull of a bear from Thibet, 101; of the head of a monkey, with peculiar development of the canine teeth, ib.; of the head of a cheetah with the skin preserved, ib.; of the lower jaw of Diprotodon, 264; skull of Macropus major, ib.; onychogalea—, ib.; Bettongia Ogilbyi, ib.; Phalangista vulpina, ib.; Phalangista lanuginosa, ib.; Perameles nasuta, ib.; Phalangista—, ib.; malformed temporary incisors, ib.; of a dilacerated incisor, ib.
Museum, report of the curator (Mr. C. S. Tomes), 68.
Murphy, Mr. J. E. (Derby), elected non-resident member, 42.

N.

Neumann's observations on caries, 109.
New Dental Society, formation of the, 74.
New members elected, statement of, 87.
New members, mode of election, discussion on, 252.
Nitrous oxide gas, recent death from, 220.
Nostril, discharge from the, consequent on alveolar abscess, 15.

O.

Odontoblasts, 104, 114.
Odontological Society of Great Britain, aspersions on, 76; position and prospects of, 77, 83, 98.
Odontology, conservative treatment in, 79.
Officers and council, election of, 73.
O'Meara, Mr. (Simla), donations to the Museum by, 101.

P.

Paget, Sir James, elected honorary member, 41.
Papers read: by Mr. G. D. Pollock, F.R.C.S., 7; by Mr. Joseph Walker, M.D., M.R.C.S., L.D.S., 55; by Mr. Charles S. Tomes, M.A., 89; by Dr. Arkövy, 103; by Mr. Felix Weiss, L.D.S., 135; by Mr. Ashley Barrett, M.B., M.R.C.S., 193; by Mr. Henry Moon, M.R.C.S., L.D.S., 223.
Parkinson, Mr. Jas., elected treasurer, 73.
Parks, Mr. W. J., elected councillor, 73.
Payne, Mr. A. G. (Southampton), nominated for non-resident membership, 181; elected, 251.
Petty, Mr., donations to Library by, 131.
Pierrepont's movable arm-rest, 218.
Poisoning by coloured vulcanite, alleged, 203.
Pollock, Mr., on alveolar abscess, 7; reply to discussion on, 39.
Position of the Odontological Society, 77.
President, election of, 73.
President's opening address, 97.

Pulp: devitalization of, 62; exposed, application of arsenious acid to, 63; exposed, treatment of, 55; extraction of, 55, 58; inflammation of, 57; suppuration of, ib.

R.

Randall, Mr. E. B., elected councillor, 73.

Ranger, Mr. W. G., elected honorary secretary, 73.

Reboul, Mr., appointed auditor, 41.

Regulating case, Mr. Fothergill's, 2.

Regulation of teeth without mechanical appliances, 69.

Report of the committee on the supposed mercurial poisoning by coloured vulcanite, 203.

Resignations of members, 83.

Rogers, Mr. Charles, on the Dental Hospital, 84; elected vice-president, 73.

Rogers, Mr. Thomas, on a case of swallowing teeth, 69; elected librarian, 73.

Rose, Mr. J. E. (Liverpool), elected non-resident councillor, 73.

Rubber dam, advantages of the, 194; its use in hospital practice, 4.

Rymer, Mr., on the prospects of the Odontological Society, 83.

S.

Saliva, exclusion of, during operations, 193; the rubber-dam, 194, 195; modus operandi, 196.

Saliva-bag, new india-rubber, 217.

Salter, Mr. James, on alveolar abscess, 12.

Saunders, Mr. Edwin, elected vice-president, 73.

Savory, Mr. Wm. S., elected a honorary member, 41.

Secretaries, honorary, election of, 73.

Sewill, Mr., on abscess in the canthus of the eye, 33; on alveolar abscesses generally, 34; on cases of swallowed teeth, 48; on the development of the molar teeth, 54; on the treatment of irregularities, 72; on the development of dentine, 126; on the danger of dislodging violently impacted substances in the œsophagus, 177; on deaths from inhalation of nitrous oxide gas, 187; on Mr. Coles's proposition as to the mode of conducting elections of members, 252; elected councillor, 73.

Simmons, Mr. J. J., nominated for resident membership, 67.

Smith, Mr. W. T., nominated for resident membership, 181 elected, 251.

Spray-producer, new application of, 132.

Statistics of dentistry, 81.

Stent's modelling material, 70.

Stocken, Mr., on models of wisdom teeth, 132; on nitrous oxide gas, 220.

Subscription to the Odontological Society, proposed alteration in, 79.

Simmons, Mr., elected resident member, 131.

Supernumerary bicuspids, rarity of, 253.

Supernumerary teeth, 224.

Swallowed artificial teeth, 43.

Swanson, Mr. A. E., nominated for membership, 1; elected, 67 admitted a member, 97.

yphilitic peculiarities of teeth, 237; effects on the teeth of children, 257; syphilitic deformity of the temporary teeth, 258; diagnostic value of the syphilitic tooth, 260.

T.

Teeth: fastening, new method of, 1; regulating, 2; mineral, 3, 5; alveolar abscess of the, 7; caries of, 12; amaurosis consequent on decay of, 22; cysts in connection with defective, 26; extraction of, in alveolar abscess, 29; formation of the crowns of the, 55; carbolic acid in suppuration of the pulp of, 57; inflammation of the pulp, 57; arsenic in suppuration of, 60; devitalization of the pulp, 62; regulation of, without mechanical appliances, 69; conservative treatment of the, 79; extraction and stopping of, 80; of elephants, 89; the intertubular substance of the, 110; calcification of the, 124; washing out of, 132; artificial, swallowed or impacted in the pharynx, 135; coloured vulcanite, effect on the, 203; development of the, 223; irregularity of the, ib.; formation of supernumerary, 224; deficient size of, 225; defective form of, ib.; infantile syphilis, its effects on, 237; syphilitic peculiarities of, 237; honeycombing of, 243; typical form of the, 245; mercury, its effects on the, 246; enamel of the, ib.; rarity of supernumerary bicuspids, 253; bicuspids of triplets, ib.; separate development of individual denticles, ib.; their tendency to assume autonomy, 254; the typical syphilitic teeth, ib.; alleged disastrous effect of mercury on children's teeth, 255; honeycombed, ib.; the theory of denticles, 256; teeth of the insectivora, ib.; trilobed shape of the incisors, 257; syphilitic effects on, ib.; mercurial teeth, 258; time at which calcification commences, 260; dentinal tubuli in enamel, 261; cases of honeycombing, 262; treatment of alveolar abscess, 263.

Tomes, Mr. Charles: on alveolar abscess, 10; on a case of swallowed teeth, 49; on a plan of regulating teeth, 51; on the molar teeth of an elephant, 54; on tooth pulp, 65; on the condition of an elephant's tooth which had been injured by a rifle ball, 89; on a case of swallowed artificial teeth, 176; on a death from inhalation of nitrous oxide gas, 187; on the rubber dam, 200; on the effects of syphilis on the teeth, 246; on the penetration of dentinal tubes into the enamel in the marsupials, 255; on Mr. Moon's theory of "denticles," 258; elected curator of Museum, 73.

Tooth-ache, and alveolar abscess, 13.

Tooth pulp, treatment and extraction of, 55.

Treasurer's financial statement, 86.

Turner, Mr. J. S., on a drill for piercing teeth, 3; on india-rubber rings, 3; on alveolar abscesses, 35; on extirpation of tooth pulp, 64; on regulation of the teeth without mechanical

contrivances, 69; on movement of the teeth in irregularities, 72; on some donations to the Museum, 101; on a death from nitrous oxide gas, 186, 188; on a plate impacted under the tongue, 176; on the rubber dam, 201; elected hon. secretary, 73.
Tusks of elephants, infrequency of injuries to, 90.
Typical form of teeth, 245.

V.

VANDERPANT'S new india-rubber saliva-bag, 217.
Vaseline, a new preparation for coating Stent's compositions, 70.
Vasey, Mr. Charles: on treatment of irregularity, 4; on the use of mineral teeth, 5; on a case of swallowed teeth, 47; on Stent's modelling method, 70.
Vice-presidents, election of, 72.
Vote of thanks to the retiring president, 84.
Vulcanite, alleged poisonous properties of, report by committee on, 203.

W.

WALKER, DR. JOSEPH: on treatment and extraction of the tooth pulp, 55, 65; on cases of artificial teeth swallowed, 178.
Washing out cavities, spray-producer for, 132.
Watson, Mr. J. E. (Paris), death of, 78.
Wedl, Herr Karl (Vienna), elected honorary member, 41.
Weiss, Mr.: on a case of swallowed artificial teeth, 43, 48; on artificial teeth impacted in the pharynx, 133; on the frequency of such cases, 179; on a supernumerary bicuspid, 252; elected councillor, 73.
West, Mr., elected councillor, 73.
White, Mr.: on a new fastening, 1; on the treatment of irregularity, 4.
Whittingham, Mr. A. W., donation to Museum of two malformed temporary incisors, 264.
Woodhouse, Mr.: on artificial teeth swallowed, 178; on the rubber-dam, 200; on the exclusion of saliva, ib.; elected vice-president, 73.
Woodhouse, Mr. R. H., elected residnet member. 41; admitted to membership, 68.

# INDEX TO PLATES.

PLATE I.—Side view of an elephant's tooth which has been struck by a bullet.

II.—Horizontal section of same tooth.

III.—Pneumatic mallet and dental engine.

IV.—Irregular and defective tooth development,

Fig. 1. Separate denticles.
2. Denticles united with teeth.
3. Supernumeraries of bicuspid form.
4. Two-cusped supernumerary.
5. A so-called cubic tooth.
6. A **T**-shaped temporary incisor.
7. Irregularly bundled-together denticles.
8. Radicular odontome.
9. Two odontomes.
10. Differences between normal-shaped teeth,
11. And those malformed through syphilis.

V.—Fig. 1. Tumour produced by hypertrophied dilated tooth-root.
2. The teeth of a child aged 11.
3 and 3 a. Teeth being succeeded by single-cusped premolars.
4. Teeth of a child at age of 9.
5. Teeth showing one incisor of perfect form, and one of typical syphilitic shape.

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# TRANSACTIONS

OF THE

# Odontological Society of Great Britain.

VOL. X.—NEW SERIES.

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OF

# GREAT BRITAIN.

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1878.

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# GENERAL MONTHLY MEETING,

*November 5th*, 1877.

ALFRED WOODHOUSE, Esq., Vice-President, in the Chair.

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The Minutes of the previous Meeting were read and confirmed.

The following gentlemen were nominated for Membership :—

Mr. George Frederick Pasmore, 22, Queen-street, Exeter, Non-resident.

Mr. Andrew Robertson, 25, Castle-street, Hereford, Non-resident.

M. E. Magitot, 8, Rue de Sts. Pères, Paris, Corresponding.

The following gentlemen were elected Members of the Society :—

Mr. Martin Luther Bell, L.D.S., St. Margaret's-street, Canterbury, Non-resident.

Mr. Arthur Grenville Levason, 12, Bridge-street, Hereford, Non-resident.

Mr. Claude Rogers, M.R.C.S., L.D.S., D.M.D., (Harvard), 2, Cork-street, W., Resident.

The following gentlemen having signed the obligation book, were admitted Members of the Society :—

Mr. W. Taylor Smith.

Mr. H. A. Bevers.

Mr. James J. Simmonds.

Mr. E. R. Keeling, Junr.

The President announced the following Contributions to the Library :—

Francis Mason, on "Hare-lip and Cleft Palate"; presented by the Author.

Magitot, "Traite des Anomalies du Système Dentaire;" presented by the Author.

"Transactions of the American Medical Association during the year 1876."

Vol. of Prize Essays, from the same Society.

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The Secretary then read a communication from Mr. Crapper, of Hanley, on "Continuous Gum Work."

Invented about twenty-five years ago, by Dr. John Allen, this system of work has always found more favour in America than in this country.

The objections which have been brought against it are—first, its weight, and secondly, the time and trouble necessary to effect repairs in case of breakage.

The first objection Mr. Crapper does not allow to be real; although the work is heavy, patients do not feel the weight, and he states that he has never heard a patient complain of it, even though the set had been substituted for one of vulcanite or celluloid. The plate is kept in position by atmospheric pressure—fourteen pounds to the square inch—and if it fit accurately the pressure is so evenly distributed that the patient

does not experience the slightest feeling of traction on the gums. With reference to the formation of suction cavities in plates, Mr. Crapper thinks that those having sharply-defined edges are objectionable, and that graduated suction cavities are the best, being just sufficient to prevent the plate from pressing upon the hardest portion of the palate.

The second objection is more real, and it is advisable to impress upon patients the necessity of taking great care of their teeth when out of the mouth. It is a good plan to keep a small wooden bowl to wash them in, as they may be injured by being dropped into an ordinary wash-hand basin. Mr. Crapper thinks, however, that this objection does not counterbalance the advantages conferred upon the patient both as regards comfort and natural appearance. One often meets with cases of prominent alveoli and short upper lip, the gum showing very high ; in such cases the artificial gum can be worked to a thinness unattainable by other methods, and a more natural appearance can thus be obtained. Mr. Crapper could speak from personal experience, as he had worn for some time past an upper denture made on this principle, and could testify to having derived more comfort from it, combined with other advantages, than he had previously experienced from other appliances.

As the plate is retained in the mouth by atmospheric pressure, a considerable amount of care and attention to detail is required in the making ; it must be a perfect fit, else it will be useless. The first step is to take an impression of the mouth in plaster of Paris. Pure soft platinum should be employed as a base, without it the porcelain would be too soft for ordinary work. After swaging the plate, and finishing to the desired form, pure soft platinum wire of a conical shape should be soldered with pure gold round the edges ; the plate should then be "roughed" by a sharp sculptor, after the style of chasing or frosted work, so as to cause the body to be retained on its surface when fired. The bite having been accurately ascertained, and suitable teeth selected, they should be ground and adapted after the usual manner. The piece

may now be tried in the mouth and correctly articulated; "having satisfied yourself that it fits properly, insert the teeth in a casing of plaster of Paris, asbestos, and silver sand." This should be slowly dried, and the retaining wax removed by a stream of boiling water. Strips of soft platinum should then be passed under the pins of the teeth, closing them securely over the strips. Pure gold only should be used for the soldering; this should be cut into small portions and placed *in situ*, so that when subjected to the heat of the furnace the gold will readily secure the pins and strips to the plate. "Allow the piece to cool gradually; let it be carefully washed and well dried, then with a suitable spatula apply the silicious body carefully, with the judgment which can be acquired only by practice and with a cleanliness which is indispensable." Usually after the first firing cracks and flaws will be found, these should be carefully filled up with new material, and the piece fired again; this must be repeated until an even, smooth surface is obtained. The enamel should then be applied in the same manner as the body. Repeated firings, either in the first making or for repairs, do not injure the plate or teeth provided proper care be taken to heat and cool the piece *gradually*. Before effecting repairs the pieces should be boiled first in dilute sulphuric acid, and subsequently in a saturated solution of subcarbonate of soda, in order to remove all traces of the buccal secretions. To give a neater finish, the continuous gum set is plated with fine gold by means of the gilding solution.

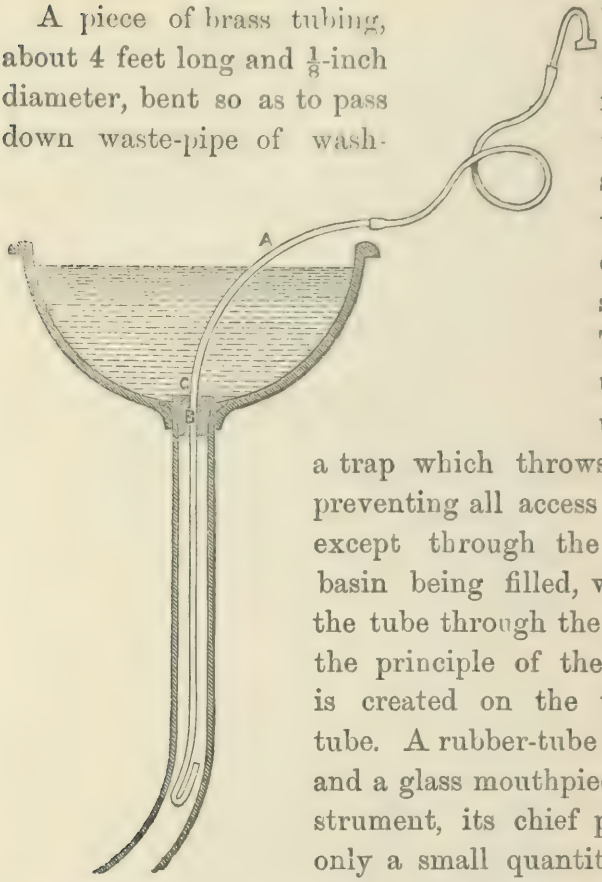
With reference to the Cheoplastic process, specimens of which were exhibited by Mr. Crapper, he remarked that it was most suitable for lower cases; and when great absorption of the alveoli had occurred, the gums presenting an almost flat surface, he found that when relief was subsequently required by the rounding of the outer edges, the necessary filing could generally be done without interfering with the original finish. When continuous gum work is adopted for lower pieces a well-defined prominent ridge of the gum is necessary; but in cases when additional weight may be advantageous, the

Cheoplastic lower gives increased steadiness and deadness of fit. For a detailed explanation of this process he referred those interested to the account given in Dr. Harris's work on the "Principles and Practice of Dentistry."

Mr. CRAPPER added, that some of the specimens exhibited had been made with bodies and enamels of his own composition, which fused at a lower temperature than did those used by Dr. Allen. He had recently been experimenting with the view of substituting a gas furnace for the ordinary coke fire, but, although he had met with a certain amount of success, his results as yet had not been sufficiently satisfactory to justify him in bringing them before the Society.

The PRESIDENT thanked Mr. Crapper for his very practical paper: he had not much experience of the system himself, but he thought the Society was indebted to Mr. Crapper for calling its attention to a method which was not much practised in this country, but which, in some hands at least, appeared to give very satisfactory results.

*Description of Saliva Pump*, shown by Mr. CLAUDE ROGERS, at the November Meeting of the Odontological Society, 1877.




A piece of brass tubing, about 4 feet long and $\frac{1}{8}$-inch diameter, bent so as to pass down waste-pipe of wash-basin, with cork attached at B, which fits into opening of waste-pipe so as to stop all egress of water from basin except through small pin-hole at C. The lower end of the tube is turned upon itself, forming a trap which throws the water back, preventing all access of air to the tube except through the upper end. The basin being filled, water passes down the tube through the pin-hole at C; on the principle of the syphon, a draught is created on the upper end of the tube. A rubber-tube of sufficient length and a glass mouthpiece complete the instrument, its chief points being—that only a small quantity of water is required to work it (about $1\frac{1}{2}$ to 2 gallons an hour), simplicity,—and cheapness.

The amount of suction created is enough to draw up pure glycerine, which serves as a fair substitute for viscid saliva.

Mr. COLEMAN said that his colleague Mr. Ewbank had lately been using Mr. Rogers's invention, and had been much pleased with its simplicity and efficient action.

Mr. CHARLES TOMES said that after seeing Mr. Rogers's invention, he had a modification of it fitted up in his own operating-room. Instead of placing one end of the tube in the

waste-pipe, he had it carried down the leg of the chair and through the floor; here it was joined by a horizontal tube communicating with a cistern, the aperture between the tubes being very small. Beyond the point of junction the vertical tube was carried downwards, and opened externally. Turning on the water from the cistern at once set the pump in action; the apparatus was thus almost automatic, and the basin left free for its legitimate uses. He found that a consumption of three quarts of water per hour sufficed to keep the pump in full work.

Mr. Tomes then proceeded to exhibit a specimen which had been sent to him for examination by Dr. Barrett of Buffalo, U.S.A. It was a lobulated calcified tumour, of ovoid shape, measuring about $\frac{5}{8}$ of an inch in length by $\frac{3}{8}$ in width, attached to the roots of a lower molar tooth. It partly surrounded the apices of both the roots, but microscopical examination showed clearly that the growth was invading the tooth, and did not spring from it or from any portion of its formative pulp. Mr. Tomes believed the specimen to be unique; certainly it was quite unlike any he had hitherto seen figured or described. As to its nature he was not certain; it might be a calcified enchondroma, or it might be an odontome springing from the germ of another tooth; no dentine was, however, discoverable in any part, so far as he had yet examined. Unfortunately, Dr. Barrett had not yet been able to obtain any history of the case, though he still hoped to do so.

Mr. Tomes also exhibited an elephant's tusk, the growth of which had been curiously perverted; it was studded with irregular masses of secondary dentine.

Mr. Moore, of Croydon, then related the following case. A lady called upon him in June last with her son, a boy about eleven years old. The latter complained of a tumour in the mouth, which, on examination, proved to be a dentigerous cyst; it appeared to be connected with a deciduous molar. Mr. Moore extracted this, the cyst was opened, and some glairy fluid escaped. After mopping it out with dilute carbolic

acid, the crown of the second bicuspid could be seen just appearing at the bottom of the cavity. The adjacent permanent molar was carious, but Mr. Moore did not think it necessary to interfere with it just then, so he told the boy to come again in a month's time. But when he presented himself in July no diminution had taken place in the size of the tumour, and the growth of the bicuspid had not advanced; in August the state of things was the same. Mr. Moore now extracted the carious molar, and found its periosteum thickened and congested. In September the tumour had begun to decrease in size; in October the diminution was considerable, and when the boy was last seen, a few days before the meeting, it had almost disappeared. Mr. Moore thought that the case was interesting, as confirming the account which Mr. Tomes gave of the pathology of dentigerous cysts, viz., that they were due to excessive secretion of fluid in the sac which protects the crown of the growing permanent tooth, and he thought that in this case the excessive secretion was probably caused by irritation set up by the inflamed and carious molar which he had extracted in August.

Mr. Howarth then exhibited a new lathe head.

Mr. Pedley exhibited his apparatus for the administration of gas and ether, and explained its action. Its most noticeable feature was an ingeniously-constructed tap placed between the face-piece and the reservoirs; on this was stamped "air," "gas," "gas and ether," and "ether and air," and by setting the button of the tap opposite any one of these marks the patient could be made to inhale that which was indicated on it. The apparatus, which was very portable, was thus equally useful for long or for short operations.

The President then called upon Mr. S. Hutchinson to read his paper on "The Radical Cure of Alveolar Abscess."

## *The Radical Cure of Alveolar Abscess.* By S. J. Hutchinson, M.R.C.S., &c.

Mr. President and Gentlemen,

I cannot enter upon the subject of my paper, without a few words of explanation as to how so familiar a topic has been chosen. At an early meeting of last Session, March or April, it was decided to have an evening set apart for discussion, without a formal paper, and I was asked by the officers just to start the above subject. However, the supply of papers was so full that no opportunity for such a discussion offered itself, and I willingly held myself ready for any time when a blank should occur.

As I have already said, by the activity of our officers no such blank occurred, and at the last meeting of the Society it was decided that at the November meeting I should read a short paper on "The Radical Cure of Alveolar Abscess."

Constantly before my mind has been the fact that the paper was to be read to a society of practitioners well skilled in their art, and not to mere tyros, and that, therefore, copious extracts

on the pathology of alveolar abscess would be out of place. I have, therefore, confined myself to acknowledging most of the sources from which the following notes are taken, and giving also a few cases, illustrative of a plan which seems to give the keynote to a greater success in its treatment.

I will quote from Taft's "Operative Dentistry," 3rd Edit., just published, wherein he admits: "In regard to the treatment of alveolar abscess much remains to be learned. With the attainments thus far made in this direction no aspiring dentist will rest satisfied, though in the hands of a few it has made great progress within a very recent period." This book has only been published a few months, and is the most recent authority, yet the following plan is not alluded to, although in the November number of the *Cosmos*, 1876, Dr. Farrar gave some of its details.

Last session two-thirds of the papers were about the complications of the nerve-pulp, alive and dead, and since April there has been time to collect cases, with which I trust we may be favoured. Our President in February, as also Mr. Barrett, in December, 1875, said that "he hoped a categorical list of cases would settle the matter finally." I, unaided, cannot hope to do this, but wish Mr. Barrett's idea may be realized. Mr. Coleman, Mr. Ashley Barrett, Dr.

Walker, and Mr. Spence Bate all alluded to the cure of alveolar abscess in their papers, and spoke of creosote, arsenic, and carbolic acid as the agents; and Mr. Underwood, Dr. Field, and Mr. Stocken each described their methods, using creosote, salicylic, and carbolic acids.

In looking over the old Transactions, in 1861 I find our President wrote a paper on fang-filling, before the discovery of carbolic acid, and alcohol was the purifying agent, with creosote. In May, 1865, Mr. Woodhouse introduced the subject of carbolic acid as a dressing for exposed nerves, and predicted the usefulness it has since attained; and in November, 1865, Mr. Thomas Rogers's paper was on fang-filling, and he used creosote and iodine as a dressing, saying he often found abscesses disappear, he did not know how or why. Mr. James Bate, in February, 1867, had a paper on the carbolic treatment.

The most obvious and the most successful cure of alveolar abscess is the extraction of the offending tooth, but such a course is radical indeed, and we must, if possible, inaugurate a "conservative-radical" treatment, but the cases must be chosen judiciously for the teeth to be "preserved usefully."

The upper incisors and bicuspids and the lower temporary molars are those which have been most successfully treated by me, and I will later

give the cases, and the time they were under treatment.

The term "preserved usefully" is used advisedly, because a tooth kept in the head on which the patient cannot eat, is worse than to extract it, for the obvious reason that it cripples the whole side it belongs to. The lesser evil of a tooth sensitive to heat and cold is more to be condoned, as this symptom is wont to disappear; but, personally, I must confess I have worn out my patients' endurance, and my own, in the endeavour to render hopeless teeth helpful, and I am almost losing heart at the uphill work it is.

Although the means I shall shortly detail have proved helpful in many cases, yet the failures are numerous, and I think a broad line of distinction may be drawn, dividing two classes,—1st. Where a fistulous opening or chronic "gum-boil" is present. 2nd. Where this does not exist, but there are symptoms of periostitis and latent alveolar abscess.

These two classes each contain all the successes and failures—the successful cases where a "gum-boil" exists, the unsuccessful ones where the disease has not progressed so far. And to the former division I would chiefly devote my paper, seeing that my hitherto experience has been favourable; and on the other division I would crave the members present to freely debate, as there is much to learn on this point.

This part of the paper will not contain any original matter, as it must be admitted the plan adopted has been published before, and, indeed, referred to in this room, but the manner of applying the dressing is a little different, and, I believe, more advantageous.

To take a typical case—say a central incisor, of which the pulp has come to grief from the application of an osteo-stopping, the most common cause—and it will be found that the cervical edge of the stopping has wasted away, and the pulp is dead and decomposed, with a small chronic abscess over the apex of the fang. Here we have a most favourable specimen to treat, provided excavation of the caries and the stopping leaves the tooth a good colour.

Having removed every particle of pulp-remains from the fang as far as is possible without going through the apex of the fang, a light dressing of aconite and chloroform should be applied up the root. This dressing of aconite and chloroform is well worthy of note as an application when the pulp cavities have been cleaned out, but all periostitis not subsided, for it acts then like a charm in removing the tenderness of a tooth in its socket.

A chief point to observe in order to gain success, is to be more than careful of the perfect cleanliness of the barbs and broaches used in clearing out the fang. This seems a small matter,

but too much care cannot be used, when one remembers that Professor Lister, at King's College, said, "that a needle-point dipped in a very weak solution of decomposed blood and water, and then that needle-point only allowed to touch the edge of a pure vessel of blood, would develop in it crowds of bacteria!

On the next day but one the treatment may commence (after putting on the rubber-dam) by the application of pure crystals of carbolic acid, Calvert's No. 1, into the pulp cavity, and here is the point I desire to be noted—that no water or glycerine should be added as a solvent of the acid, the heat of the tooth in a few seconds being sufficient to melt the crystals, and to insure the absence of germs by any diluent. The crystals are most easily applied on a fragment of amadou to which they cling, and do not drop about the mouth.

A piece of wool should be wrapped round a flexible broach, so as to form a sort of piston-rod the size of the pulp cavity, and being saturated with carbolic acid it will not absorb that already in the tooth, but if the piston be worked up and down will force the acid well up the tooth, and possibly through the apex of the fang, so as to appear on the surface of the gum through the fistulous opening—this I have been able to do on a few occasions in the most successful cases.

When this has been thoroughly performed the cavity may be syringed out with warm water, and the same process repeated. The tooth may now be considered ready for filling, and during the preparations the whole cavity should contain pure carbolic acid on wool in excess, and it is well to keep the rubber-dam on all the time, as it keeps the acid in due bounds. A fresh minute piece of cotton is taken soaked in the pure acid, having also ready several broaches with clean wool on them to dry out the chamber, then with a fine instrument pass up the carbolized wool to the apex of the fang, and next an equally small piece of wool immersed in a very liquid mixture of osteo, as thin as cream, and the wool loosely wrapped, so as to be imbued with the fluid; this next goes up the fang as quickly as possible, the object being to seal up an atmosphere which shall be antiseptic. The remainder of the fang can now be filled with fluid osteo, with filaments of wool in it to ensure its being well carried up the root.

The cavity of decay, when the osteo is hard, may be filled with gutta-percha stopping, as being the most easily applied and easily removed in case of bad consequences.

It is maintained that by having all particles of pulp, by any chance not removed, thoroughly saturated in carbolic acid, and then sealed up

hermetically in that condition, there is less likelihood of a bad result from any access of atmospheric air, the germs of which should cause putrescence. There is thus inaugurated what has been justly termed "conservative antiseptic dentistry," and the conditions here exist for the perfect hindrance of decay, and I may be pardoned if I wander from the point to remark, that the great desideratum (yet, alas! undiscovered) is a stopping of the nature of osteo which shall be applied similarly, but which shall not wear away under mastication, for it would fulfil every requirement of the patient, and most certainly prevent the spread of caries, besides removing all fear of electro-chemical action from the mixture of gold and amalgam fillings.

And I must further crave your pardon, when I say that if a reliable stopping can be put in a tooth in half-an-hour, it is not to the patient's interest to spend two over it.

Papers have been read before this Society on the various phases of alveolar abscess, but the text books do not give this particular method of treatment.

Mr. Coleman has tried the removal of the tooth, excision of the abscess, and replantation. I hope we shall hear of his success. Mr. Spence Bate recommends glycerine applied like carbolic acid; and Dr. Farrar, in the paper in *Cosmos*,

November 1876, uses a special syringe adapted by himself, which ejects creosote or aromatic sulphuric acid down the fangs or into the fistula. Taft proposes the somewhat heroic treatment of trephining the bone over the apex of the diseased fang, and excising the abscess.

Others, again, practise a method of establishing a more perfect sinus by means of a seton or plug, so as to allow the abscess to heal out from the bottom.

So far the treatment has depended on a condition of chronic abscess opening on the gum surface; but before this stage is reached, it is necessary to have some means at command to save the tooth, and instead of using carbolic acid, I recommend creosote and morphia mixed into a strong paste, for the heat of the tooth liquefies this sufficiently to let it go well up the fangs; and a wonderfully soothing effect it seems to have—the creosote is antiseptic and the morphia anodyne; by this treatment a tender tooth, raised in its socket, may, by a few weeks' careful dressing with creosote and morphia, be made ready to stop with every chance of success.

Mr. Coleman, at one meeting, spoke of the use of arsenic as a permanent dressing at the bottom of large and old cavities in refilled teeth; it would be interesting to know whether he still finds this application successful.

With regard to cases I find most amenable to treatment, I can quote several of upper incisors and bicuspids; but except in the case of children, I do not find the molars particularly subservient to treatment.

Case I.—Miss M. Left upper lateral dark in colour; pulp dead; chronic abscess; gold stopping. Removed stopping; cleaned out fang; applied pure carbolic on wool without attempting to force it through the apex of fang on first day. In two days changed dressing and put on rubber-dam, which, by the way, should always be applied; filled the pulp-cavity with crystals of pure carbolic acid, saturated also a plug of wool which would just fill cavity like a piston-rod; pumped it up and down, and was able to see the gum blanch at the fistulous opening, showing that the acid had worked right through. I now put a fresh piece of wool soaked in carbolic, about the size of millet seed, at the extreme apex of fang, to prevent air being forced through the fang; then, mixing some osteo very thin and involving in it shreds of wool, I proceeded to fill the fang perfectly air-tight and antiseptic, nearly to the pulp-chamber; this I filled with Hill's stopping, and at the end of a week removed this and put in gold, the tooth having much improved in colour and appearance, and the fistula quite disappeared.

Case II.—Mrs. T. Right upper first bicuspid, with chronic sinus. Here, on cleaning out remains of pulp, it was followed by inflammation of periosteum and swelling of cheek and eyelids; but patient was determined to persevere, so after a longer period of dressing (about a fortnight) with carbolic acid, the tooth became ready for filling exactly as described, only the gutta-percha has not yet been replaced by a harder material.

Case III.—Master H. R. Acute abscess at roots of first temporary molars; age five years; parents and myself very anxious to keep them their due time.

The abscess pointed over the roots and discharged freely, and by clearing out the remains of the pulp and dressing with carbolic acid, which in this case came out through fistula, I was in a fortnight able to fill them both, and six months afterwards they were quite healthy and firm in their sockets.

I think I have here given sufficient evidence of the success of this method, though my case-book contains others, and in my hands, at least, the pure carbolic acid treatment with perfectly air-tight and antiseptic stopping, seems best adapted for the radical cure of alveolar abscess.

## Discussion.

The President remarked that the subject was a most important and interesting one ; all present must have had ample experience of the troublesome nature of the complaint ; it must be allowed that the methods of treatment at present in use were not altogether satisfactory, and if the discussion should add to their resources in this respect, the evening would not have been spent in vain.

Mr. Vanderpant said that his experience of arsenic had not been satisfactory. He had lately stopped a tooth after devitalizing the pulp with arsenic ; the pain soon returned, and on removing the filling he found that hæmorrhage had occurred into the pulp cavity. He then used Mr. Oakley Coles's pepsine ; a week afterwards he found that the pulp had disappeared, and he was able to stop the tooth successfully with Ash's composition.

With regard to Mr. Hutchinson's treatment, there was one fact which he thought that gentleman had overlooked, and which would very materially interfere with the success of his method in some cases, viz., the fact that an alveolar abscess was not always found at the apex of the fang, but might form in other situations. He had had evidence of this on his own person, for after having had a very troublesome tooth extracted, the abscess was found to be at the point of bifurcation of the roots. Had Mr. Hutchinson any means of diagnosing the seat of the abscess ?

Mr. Coleman said that he had never asserted that arsenic was a certain cure for alveolar abscess ; still, he had found it useful in cases when the periostitis was not very acute. He applied the arsenic under a temporary filling, and he found

that with this treatment the inflammation often subsided, and that he was able eventually to stop the tooth satisfactorily. It should be remembered that arsenic was a powerful antiseptic, and when they considered what a very small quantity was required to produce the good effects he had spoken of, he thought that these results were probably due to its power of arresting putrefaction rather than to any "devitalizing" action. Indeed, Mr. C. S. Tomes had suggested that the arsenic might under the circumstances enter into combination with the albumen of the pulp and thus form a compound which would prove to be innocuous, and he quite agreed with Mr. Tomes. As to re-plantation, he had only had recourse to this operation in cases where no other treatment was possible except extraction. Fifty per cent. of the teeth thus treated had been saved, and, when it was remembered that but for this treatment every one of them was doomed to be lost, he thought that the results were not unsatisfactory.

Dr. FIELD said he was very glad to hear that Mr. Hutchinson had been successful in his treatment of the deciduous teeth; he thought that sufficient attention was not generally given to the preservation of those teeth. The result of allowing them to get into a bad state was that the child was unable to masticate its food properly, its digestion became impaired, and as a consequence the health suffered and serious damage might be done to the child's constitution.

He had seen a good many cases of replantation in the practice of Mr. Byng, of Paris, but had not seen one which he could call really successful—not one case in which the patient could boast of a really useful tooth as the result of all the pain and inconvenience he had gone through.

His own plan was to lance deeply, opening up the abscess, and then to use Coxeter's aspirator. He thought that with care and early treatment nine-tenths of the cases of alveolar abscess could be cured; it might be necessary in some cases to keep the patient under treatment for twelve months before a satisfactory result was arrived at, and some, he was bound to

confess, baffled all treatment. Patients of strumous habit were especially bad subjects for successful treatment.

Mr. Stocken said he quite agreed with Dr. Field that the constitution of the patient was an important element in considering the prospects of the successful treatment of any given case. He should be glad if Mr. Hutchinson would give some further details respecting the treatment by aromatic sulphuric acid, which he had mentioned; was it used strong or diluted?

Mr. Charles Tomes remarked that it should not be forgotten that in treating a case of alveolar abscess we might not be dealing simply with inflammation of the soft parts. On careful examination of the affected tooth small exostoses and marks of absorption would be found on the fangs in most cases, unless, indeed, the mischief was very recent. It was, perhaps, not quite certain whether these changes were invariably present in cases of periostitis, and if, as was generally supposed, they were the result of the inflammation, we had yet to learn how far their presence might oppose an insuperable obstacle in the way of successful treatment.

Mr. Moore, of Plymouth, said that he had succeeded in finding exostoses on the fangs of almost every tooth which he had extracted on account of alveolar abscess. His usual treatment was to puncture the alveolus near the apex of the tooth.

Mr. Hutchinson, having been called upon by the President to reply, said that in the first place he wished to negative the idea that he had brought forward his plan because he had met with an unusual amount of success; he had met with a certain amount, but had also met with many failures, and had not, therefore, been as successful as he could have wished to be. His object in reading the paper had been rather to start a discussion in the hope of learning from the practice and experience of others quite as much as he had gained from his own. In answer to the query which had been put to him by Mr.

Stocken, he could only refer that gentleman to the article in the Cosmos, from which he had quoted—he had no experience of the treatment himself. In the absence of a fistula he did not pretend to be able to diagnose the seat of an abscess.

After the usual vote of thanks the President announced that at the next meeting a paper would be read by Mr. ASHLEY BARRETT, on the "Symmetrical Extraction of Teeth," and the meeting terminated.

# GENERAL MONTHLY MEETING,

*December 3rd*, 1877.

SAMUEL CARTWRIGHT, Esq., President, in the Chair.

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The Minutes of the previous Meeting were read and confirmed.

The following gentlemen were nominated for Membership :—

Mr. Mark J. Bloom, 23, Westland-row, Dublin, Non-resident.

Mr. George Brunton, Leeds, Non-resident.

Mr. Henry Augustus King, Bedford Circus, Exeter, Non-resident.

Mr. Charles Norman King, 7, Bedford Circus, Exeter, Non-resident.

Mr. Thomas Murphy, Moss House, Bolton, Lancashire, Non-resident.

Mr. Thomas F. Pedley, 9, The Terrace, Camberwell, M.R.C.S., L.S.A., L.D.S. Resident.

Mr. William Lloyd Poundall, 5, Lansdowne Terrace East, Brighton, L.D.S., R.C.S., Non-resident.

Mr. James Cowan Woodburn, 275, Sauchiehall-street, Glasgow, M.D., L.F.P.S.G., Non-resident.

Mr. Claude Rogers having signed the obligation book of the Society, was admitted a Member.

The President announced that Mr. Mummery had presented to the Society the skeleton of an elephant's head.

The President then called upon Mr. Mummery to read a communication from Mr. Dunn, of Florence, respecting Dr. Slayton's new metallic stopping.

Mr. MUMMERY then rose, and said, A few months ago—writes Mr. Dunn—Dr. Slayton, an American gentleman, who has practised for many years in this city, presented me with a sample of a preparation of his invention, of a metal, or a combination of metals, for filling teeth, which he requested me to try, and which he said possesses these valuable qualities :—

1. It does not discolour the tooth filled with it.
2. It does not itself discolour with time, in the mouth.
3. It is not affected by the fluids of the mouth.
4. It welds thoroughly well even when wet with saliva.
5. It contains no objectionable ingredient.
6. It is easy to work.

I lost no time in trying it in the mouth, and found that it appeared to possess all the qualities Dr. Slayton claimed for it.

One of the cases which I tried six months ago, the crown of an upper wisdom tooth, a very large filling, I have seen within the last few days. Its colour and appearance, in every respect, are satisfactory.

Since that time I have applied it in forty-six cases. I have not seen all of these since, but some of them I have been able to see again, and all are satisfactory.

In the filling of deciduous teeth I have found it extremely useful. In these cases I find it often so difficult to keep the cavity dry during the whole operation, that a metal which welds and consolidates well under moisture, which is easily applied, and which does not require very severe pressure to become solid, is, I think, inestimable.

In difficult lateral cavities, from its fibrous nature, it offers great ease ; it clings together, and is so soft in working, that it is almost as easy to apply as an ordinary amalgam, while by consolidating and malleting, it becomes a good solid mass.

Gold can be welded on to it (when dry), so that a cavity (should an operator desire to do so) could be filled, first, partly with this metal, and finished superficially with gold : the gold

adheres perfectly to it and is not affected by it. Dr. Slayton says that as this metal is pre-eminently a non-conductor, this might be desirable in cases of sensitive teeth.

In the early part of October in this year, at the meeting of the first Congress of Dentists in Italy, held in Florence, Dr. Slayton showed this preparation, and in presence of the members filled a cavity in the mouth with it. He also gave a sample of the metal to several dentists there and begged them to try it.

Having seen such apparently good results from it, I suggested to Dr. Slayton that it would be well for the profession that it should be made known, that those who would like to try it should be able to do so and judge of its merits or demerits.

At the same time I offered to write to some of those gentlemen to whom he had presented some of the metal, and to beg them to let me know their opinion. They, however, have been able to try it for only a little more than a month.

I wrote to six of the principal members of the Congress, who live in different cities in Italy.

Their reports on the whole were very favourable.

Two thought that it would be difficult to get it as hard and resisting for mastication as gold. One of these had covered the surface of a filling with a thick layer of gold to insure hardness. Another thought that it could not take the place of amalgam because it requires more force to introduce than amalgam. Another imagined that it might discolour; but he had not observed that it had done so.

However, all my correspondents agreed that it promised to be a very valuable addition to the materials for filling teeth. I have therefore thought it my duty to bring this new stopping under the notice of the Odontological Society, that it might be tried and reported on, in order that the profession may have some reliable basis with regard to its merits.

I forward to you a quantity of the preparation which Dr. Slayton has sent, also some teeth which have been filled with

it, under various conditions,—in the dry state ; moistened with water, also with saliva ; and after being dipped in oil : thus showing its cohesiveness and density.

Mr. MUMMERY then passed round specimens of the stopping that had been sent to him with the foregoing communication from Mr. Dunn.

Mr. WEISS called attention to the late fatal case of artificial teeth swallowing, as reported in "The Times," November 6th. At the inquest evidence was given that on Sunday, 28th October, John William Digby, aged 76, then in good health, while eating his dinner, swallowed his artificial teeth. Two months previous, it appears, the plate he was wearing, which was made of platina, broke in two, and the deceased had continued to wear the larger half ever since. When the accident occurred, his wife at once attempted to remove the teeth, but could not. Dr. Walsh was called in, but he also failed ; after which Dr. Durham, of "Guy's," was summoned, but he was equally unsuccessful, and eventually the man expired on the Wednesday following. A *post-mortem* examination was made, and the jury found that death had resulted from the shock, and from the injury to the throat.

The reason why the surgeon could not remove the teeth was because one portion of the plate, where it had been broken, formed a hook which caught in the muscles of the throat.

Dr. Hardwicke had most courteously placed the broken denture at his disposal, and certainly a more dangerous piece of mechanism it was impossible to imagine. It could no longer have fitted the mouth, and the man being at an advanced age, pharyngotomy was not attempted. The statement that death has resulted from the swallowing of artificial teeth is calculated to make a very unfavourable impression upon the public, but that impression is materially altered when we come to investigate these cases. We find in this, as in many other instances, that the patient must be blamed for his own negligence, the work having broken, and being worn in an imperfect state.

Mr. Charles Tomes showed a vulcanite flask which had been sent to him for exhibition by Mr. Palmer, of Cheltenham. It was a modification of Trill's flask, and had been contrived by Mr. Brewster, Mr. Palmer's assistant, the object being to obtain better access to the front of the mouth. It was not intended to supersede the flasks now in use for ordinary work, but would be found very useful in special cases, where the mineral teeth are so close to the gum as to make it difficult to get the rubber in front of the mouth, as well as at the back or palate, without having the flask in two pieces; the teeth being in one part and the model in the other. Mr. Palmer had found that bad fits resulted from this, through undue pressure, and that much grinding was necessary to get the teeth to bite.

The flask was closed with bolts screwed into the gun-metal and nut, while a piece of steel across the bottom formed the two points against which the nuts acted, instead of being secured by two pins, as in Trill's flask. In the larger half of the flask was a removable plate, so contrived that by unscrewing the nuts and two screw-heads, the top and front of the flask could be removed, and access could thus be obtained to the palate, back of the mineral teeth, and to the labial part and gum at one and the same time, the teeth and model being still rigidly fixed. After packing, it was easy to open or close either part for the purpose of adding or of cutting away rubber. It was also very useful for vulcanizing vulcanite teeth on gold uppers.

Mr. Charles Tomes next showed an improved tongue-holder invented by himself. He found that, with it and a saliva-pump he could do without the rubber dam, in many cases where he had previously found it necessary.

He also exhibited some forceps adapted for the extraction of upper molar stumps. One blade terminated in an elevator point. If necessary, he first drilled a small hole in the centre of the broken-down tooth, then inserting the point of the elevator blade into this depression, he split the roots and extracted them without change of instrument.

He then showed an interesting specimen of an odontome

attached to a lower molar tooth which he had found in the Society's Museum. A full description and drawing of this specimen will appear in the next number of the Transactions.

Mr. Moon said that the account Mr. Tomes had just given of the nature of his radicular odontome was of very considerable interest; for that specimen, though smaller in size, was, in the manner of its attachment to the tooth, remarkably similar to other recorded cases of radicular odontomes, and to the specimen which he had to show. This had been extracted by himself from a patient at Guy's Hospital. As the clinical history was interesting, he would read his notes of the case. "The patient, a married woman, aged 38, stated that eight years previously a swelling, the size of an egg, appeared over the left ascending ramus of the lower jaw; the tumefaction, which extended also within the mouth towards the fauces, was accompanied by almost complete closure of the jaws, and by excruciating pain. After eight months the swelling subsided and a bony mass appeared above the left lower wisdom tooth; this gradually increased in size in an upward direction until the patient came under my care. At that time its upper part had passed out of view and out of reach, behind the distal surface of the second upper molar and the tuberosity of the superior maxilla, even when the mouth was opened to the widest extent.

"Throughout the eight years the swelling, with its attendant closure of the mouth and severe pain in the temple and left side of the lower jaw, had recurred at intervals of two or three months, lasting for two or three weeks at a time: between these attacks the symptoms subsided entirely. The swelling had sometimes extended downwards over the neck and upwards to the zygoma, giving rise to ecchymosis around the eye; the wisdom tooth had gradually been pushed inwards towards the tongue, while the odontome had come more into view, and had polished facets on its anterior aspect, formed by attrition against the distal surface of the second upper molar. The patient, who, through dread of a surgical operation, had all this time avoided consulting

a medical man, was at length seen at the Gravesend Dispensary by Mr. Nesbitt, who kindly sent her to me. The removal of the odontome was very easily effected by extracting inwards the wisdom tooth to which it was attached."

The PRESIDENT then called upon Mr. ASHLEY BARRETT to read his paper on the "Symmetrical Extraction of Teeth."

## *On the Symmetrical Extraction of Teeth.* By Ashley Barrett, M.B. London, M.R.C.S.

Mr. President and Gentlemen,

Although I should naturally desire, when reading a paper before this Society, to be able to claim at least novelty for my subject, yet our art is so wide, and our knowledge of it when compared with what yet remains to be known so limited, that I believe good may often come from talking and thinking of a topic which may have been dealt with at some former time. I have no certain knowledge that the subject of this paper has been, before this evening, brought under the notice of our Society, but I have reason to believe that in America at some of the many dental meetings attention has been given to what I have termed "The Symmetrical Extraction of Teeth."

This subject is a very practical one. Even if I succeeded in making a long paper out of it by piling up dry facts and wearisome statistics, I don't think any good would result. On the contrary, I propose telling you firstly what I have seen and have learned from others; and secondly,

of certain inferences which I deduce from these facts. As a rule, the four sixth-year molars have not been long erupted before they undergo carious changes. The latter advance rapidly, and soon the dentist is called on to extract one or more of these teeth. One such case is now present to my mind. I removed from a child aged 12, one of the sixth year molars,—that on the left side of the lower jaw. I noticed, six months after, that the crown of the second molar—immediately behind the space whence the extracted tooth was taken—was inclined forwards; and the tendency seemed to be for the second molar to replace the six-year-old tooth. I was disappointed, however,—it did not do so, and when I obtained models and articulated them, I found the upper first molar, on the left side, having lost its antagonist, was a little raised above its neighbours, and had slightly dropped into the vacant space in the lower jaw. The posterior edge of this upper tooth caught against the front of the lower second molar, and so prevented the advance of the latter. The upper second molar was now decayed; I extracted it, and soon both upper and lower second molars came forward, and the spaces resulting from the removal of the first molars were greatly diminished.

This was an instructive case. About the time when I had it under treatment, a friend showed

me models of a mouth from which he had previously extracted all four first molars; he had done this not merely to get rid of carious molars, but chiefly in order to relieve an overcrowded dental arch by removing therefrom the teeth which could most readily be spared. The models were taken twelve months after the extraction of these teeth, and at the first glance one failed to perceive those spaces which one naturally expected to find between the second bicuspids and second molars. On closer examination one saw that the overcrowding was greatly lessened, and that the second molars had advanced and occupied the gaps previously existing in front of them. The second molars in fact were now in contact with the second bicuspids.

Many other cases presenting similar conditions have been brought to my notice, and from them I would suggest we may deduce this guide to treatment. That where in a young mouth some or all of the first molars are carious, and coexisting with this we find any tendency to overcrowding, we are justified in extracting all four of these teeth, in the full expectation that the spaces so caused will be completely, or at any rate, in great part, obliterated by the advance of the twelve-year molars. In pursuing the treatment, however, I think it important that three points be borne in mind. First, that to extract one, two,

or three of the six-year molars is of no avail, but that all four of these teeth should be removed; or if it be the bicuspid with which we are dealing (and to which all I have said of the molars will equally apply), we should not be content till we have taken out all four of the series, and so produced what I have termed their "symmetrical removal."

I am aware that too often the operator will meet with objections from the friends of his young patient, who may not appreciate the advantages which are in the future to flow from the present sacrifice of what are perhaps perfectly sound teeth; but the relatives may be assured that unless the treatment is carried out in its entirety, the spaces resulting from the extraction will never have a chance of being properly closed.

The second point I desire to indicate is, that it is well not to practise symmetrical removal of six-year molars, till the four twelfth-year molars are erupted, or show unmistakable evidence of being about to be cut. It would at any rate be unfortunate to extract the sixth year teeth, and having assured the friends that the spaces so caused would shortly be occupied, to find the eruption of the second molars to be greatly retarded, or possibly even not to occur at all. It is well, therefore, to delay the operation till the four teeth expected to fill the gaps are in sight.

My third point relates to the age of the patient at which symmetrical extraction should be practised. I think it is well, when one finds the majority of the first molars carious in a crowded dental arch, to extract these four teeth very shortly after the eruption of the twelve-year molars, and before the latter have reached their ultimate height. Since, without doubt, these latter teeth are most freely moved in any direction shortly after they are cut, and before the crowns of the upper and lower molars come into contact. To this latter condition I would attach considerable importance, and would advise that the most favourable period for the symmetrical extraction of six-year-old molars is when the grinding surfaces of upper and lower molars barely touch, in fact, shortly after their complete eruption at about the twelfth year of our patient.

In conclusion, let me say, the force which determines the advance of teeth into spaces situated before them, is perhaps a little obscure. Is it that movements of mastication tend to push the teeth towards the mesial line? Is there a *vis a tergo*, represented perhaps by the growing wisdom tooth, which operates upon the second molars? Or is it that, having by the act of extracting the first molars, established a cavity in front of each second molar, the latter naturally falls forward to occupy it; thus yielding in the

direction of the least resistance to the various forces which operate on it. For information on these points I shall feel indebted to any gentleman who can contribute it. My series of models, I regret to say, is not by any means as complete as I could wish. Such as I have, however, show fairly well the complete obliteration of a space caused by extraction, which may result from the advance of the posterior teeth.

## Discussion.

The President said that although there was nothing novel in Mr. Barrett's paper, it opened up a practical question which was constantly coming before members in their work, and on which all could say something from experience. Mr. McClean had read a paper on the same subject in the early days of the Society, and it was not new even then, for he had himself undergone the operation many years before that. He agreed with Mr. Barrett that great benefit resulted in many cases from the symmetrical extraction of the first molars, but there was one fact to be remembered when the question arose as to their removal to relieve overcrowding, and that was, that though the back teeth would come forwards, and fill up the gap, the front teeth did not always move back, and so the overcrowding continued. For this reason some advised that one of the bicuspids should be removed on each side, instead of the molars, as being less likely to be followed by disappointment from this cause, and he remembered one gentleman stating that he had removed all four bicuspids.

No doubt the friends of young patients often objected to the removal of sound teeth, and he had sometimes been induced to give in to their wishes, but had generally repented of his weakness; for if the teeth were not removed on both sides, the central incisors were very apt to be pushed across the middle line, and the symmetry of the mouth was thus seriously marred.

Mr. Mummery said he was glad to hear Mr. Barrett advise that the first molars should not be taken out until the second molars were properly developed: this was a point on which he should lay great stress. A common result of premature extraction was, that the second molars, instead of rising vertically into

their places, leant forward and never articulated properly with their fellows. He thought, moreover, that the first molars had received a worse character than they deserved. No doubt, in most of the cases they met with, there was nothing to do but to extract, but this was not because the teeth were specially difficult to treat, but because the patients did not come under observation early enough. When the large size of the pulp-cavity in the first molar was considered, it must be evident that the tooth must be stopped early, else the pain would be very great. He could call to mind several families in which the elder children had lost their first molars, but on extracting these he had given directions that the younger members should be brought to him as soon as any disease appeared, and in these he had been able to stop successfully, some as young as the seventh year, and they had grown up without any further extension of the caries. These teeth were often somewhat imperfect; there were frequently a good many litle fissures on the grinding surface, due to the diseases of infancy; but if parents could be induced to watch and to bring their children *before* they complained, they might be preserved for years in a very serviceable condition. For the relief of overcrowding, he greatly preferred to extract a pair of bicuspids—but always a pair.

Mr. Oakley Coles thought it was questionable how far overcrowding could be prevented by extracting teeth early, that is, before the molars were completely erupted. He thought it was pretty well ascertained that the growth of the jaws depended to a great extent on the growth of the teeth, and thus, unless all the teeth were present, the jaw was not fully developed. This fact was well exemplified in the case of the hairy "Kostroma people," who were exhibited in London a few years ago, and whom he had an opportunity of examining in company with Mr. Charles Tomes. These people, an old man and a boy, were practically edentulous, and they found that the jaw of the old man was not more developed than that of the boy seven years old. The practical inference from this was that in

young patients, teeth should be left as long as possible, and that, except under urgent necessity, none should be extracted until all were erupted.

The PRESIDENT said that Mr. Coles' statement was not true without exception. He had met with cases at the Children's Hospital in which the gap left after the extraction of teeth had perceptibly incresed, showing that the jaw grew independently and in spite of the removal of teeth.

Mr. HUNT said that on examining the models which Mr. Barrett had sent round, he found that the jaw from which the bicuspids were absent was smaller than the other, although the patient was said to be a year older; the canines also in the later model seemed to have been forced more out of position than they were before.

Mr. VANDERPANT suggested that there had been some mistake; the models could not have been taken from the same mouth.

Mr. A. BARRETT said that all he wished to call attention to in the model was that the second bicuspids were in contact with the canines, the spaces left after the extraction of the first bicuspids having quite disappeared.

Mr. HUTCHINSON said he remembered reading Mr. M'Clean's paper in the Transactions for 1856, and though the subject was old even then, still it had not been fully discussed since, and would be interesting to many of the members present; he thought, therefore, that they were indebted to Mr. Barrett for bringing it again before the Society. Mr. Mummery had raised the question whether it was not preferable to stop the first molars. He thought that the practice was generally to extract them either on account of caries or of overcrowding; but each case should be considered on its own merits. If they were much decayed, and the front teeth were crowded, it was best to extract them; but if the other teeth were regular, he should try stopping, unless they were so far gone that the pulp was exposed. For the relief of

simple overcrowding, he much preferred to extract the first bicuspids: he found that the neighbouring teeth fell together much more quickly and easily than they did after removal of the molars, and that regulation-plates could be safely dispensed with. He quite agreed with Mr. Barrett's opinion that it was advisable to wait until the second molars were completely erupted before extracting the first molars. He thought that the tendency of these teeth to move forwards was partly accounted for by the fact that the oblique fibres of the buccinator muscle were attached to the jaw over their roots, and that the dragging of this muscle on the deeper part of the tooth might also explain the tendency of the crown to fall forwards, which had been spoken of by Mr. Mummery. In conclusion, he would hand round some models which showed the evil results of unsymmetrical extraction.

Mr. Moon remarked that there was one condition which should always contra-indicate the extraction of the first molars, viz., where the cutting edge of the lower incisors impinges on the necks of the upper. The fact to which the President had called attention also deserved notice, that although the molars moved forwards, the bicuspids did not always move back. He thought this depended a good deal on the position of the canine: if this was just coming down, its wedge-like form might press back the bicuspid, but if it was already fully developed, the chance of the bicuspid moving back was not so good.

Mr. Barrett having been called upon by the President for his reply, said that he had nothing further to say, except that he could not consider Mr. Hutchinson's supposition a satisfactory answer to his query respecting the cause of the forward movement of the teeth. The buccinator muscle was not attached to the alveolar portion of the jaw, and he could not see how its superficial attachment could affect a tooth implanted in the bone at some distance from it.

The PRESIDENT reminded the members present that it was necessary to appoint two auditors to examine the Treasurer's accounts.

Mr. Fairbank was then proposed by Mr. Turner, and Mr. Hutchinson by Mr. A. Barrett, and these gentlemen were unanimously elected to the office.

The PRESIDENT having thanked the various members for their contributions and Mr. Ashley Barrett for his paper, announced that the Annual Meeting of the Society would take place on January 14, and that it would be made "Special" for the discussion of a proposed change in the Bye-laws of the Society.

The meeting then adjourned.

# ANNUAL GENERAL MEETING,

*January 14th*, 1878.

SAMUEL CARTWRIGHT, Esq., President, in the Chair.

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The Minutes of the previous Meeting having been read and confirmed, the following gentlemen were nominated for Membership:—

Mr. George Augustus Courtenay Benham, 155, Woodhouse-lane, Leeds, Yorkshire, Non-resident.

Mr. Charles Sibthorpe Bright, L.D.S., R.C.S., 14, Via Assalotti, Genoa, Italy, Non-resident.

Mr. John Laws, 125, St. George's-road, Bolton, Non-resident.

The following gentlemen having been balloted for, were declared duly elected:—

George Frederick Pasmore, Esq., 22, Queen-street, Exeter, Non-resident.

Andrew Robertson, Esq., 25, Castle-street, Hereford, Non resident.

Dr. Magitot, of 8, Rue de St. Père, Paris, was, on the recommendation of the Council, unanimously elected a Member of the Society.

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Mr. Claude Rogers exhibited a saliva-pump, constructed on the same principle as that which he showed at the November meeting, but differing from that in not requiring an independent supply of water. The vertical tube issued from the bottom

of a small iron reservoir, which could be suspended from a nail in the wall, and which held enough water to keep the pump in action for about four hours. At the lower end of the vertical tube was a water-valve, which greatly increased the suction-power, since, in the event of any obstruction of the mouth-piece by viscid saliva, &c., the water would rise in the tube above the valve, until its weight was sufficient to overcome the resistance. Mr. Rogers added that the Dental Manufacturing Company had made a somewhat similar apparatus, but he claimed that his was cheaper, and simpler in construction.

He also showed a shield which he had found very useful for keeping the tongue out of the way while stopping deciduous teeth, and for small cavities, where it was not worth while to use the rubber dam. The shield was fixed by a spring clip, which passed round the neck of the tooth, and had at the base a ring, which received, and kept in position the nozzle of the saliva-pump.

Mr. Stocken showed an improved form of combined amalgam carrier and plugger, which had been made from his designs by Collins, of Poland-street.

Mr. Bell Longhurst exhibited a model of the upper jaw of a lady, showing great absorption of the anterior alveolar border and palate, caused by the persistent pressure of a pad of soft paper between the roof of the mouth and an old misfitting denture, which, by age, had become too short; the object of the pad being to make the artificial teeth appear much longer, and to produce a certain amount of suction. The pad merely consisted of paper roughly folded several times upon itself, about an inch square, and fully half an inch thick. It was renewed daily, and had been increased in bulk year by year, as the absorption advanced.

Mr. Vanderpant remarked that a good deal of pain was sometimes caused by the pressure of a clasp round the neck of a tooth. He found that this was very speedily and effectually

removed by painting over the tender part a mixture of collodion and morphia, of the strength of four grains of the latter to a drachm of the former. Ten minutes after the application, the plate could be re-inserted, and worn without inconvenience.

The PRESIDENT then called upon the members present to nominate six of their number, two of whom would be appointed by himself to act as Scrutators.

The following gentlemen were accordingly chosen :—Messrs. O'Duffy, Ibbetson, George Henry, R. Rogers (of Cheltenham), George Payne, and I. Lyons.

The PRESIDENT then appointed Messrs. Henry and Lyons Scrutators of the Ballot.

The PRESIDENT next called upon the Treasurer, Mr. James Parkinson, to present his annual report, which will be found appended to the present number of the Transactions.

The PRESIDENT then requested the Librarian to read his statement.

Mr. THOMAS A. ROGERS then rose and said—"The usefulness of the Library is constantly increasing, 107 books having been borrowed during the past year, against 88 the year before. I regret to say the following works are missing, and I shall be greatly obliged to any Member who may happen to have any of them in his possession, if he will kindly return them at his early convenience :—No. 173a, Heath's 'Injuries and Diseases of the Jaw'; No. 260, 'Journal of Anatomy and Physiology, vol. viii.; No. 303, Kölliker's 'Manual of Human Microscopical Anatomy'; No. 408, Garretson's 'Oral Surgery.'"

Mr. CHARLES TOMES then gave in the following report as Curator of the Museum :—

"The donations to the Museum during the past year, though perhaps not as numerous as in some preceding years, have been of as great interest. Among the more valuable presents may

be noted a fine lower jaw of the gigantic extinct Kangaroo (Diprotodon) presented by Mr. Eden, a fine Cingalese Elephant's skull presented by Mr. Mummery, and a skull of Stenorhyncus presented by Mr. Howard Mummery. But few additions have been made by purchase, specimens of sufficient interest not having been met with; a few typical and instructive specimens have, however, been secured for the series illustrating Comparative Odontology.

"The attention of Members of the Society is drawn to a resolution of Council to the effect that specimens must on no account be removed from the Museum without the written sanction of the Curator, the breach of this rule having led to some little disarrangement of the cases."

The PRESIDENT then delivered the following address :—

## PRESIDENT'S ADDRESS.

Gentlemen,—It is the penalty of those who are advanced in age to find each year pass by more quickly than the last. It seems to me but a very short time since my predecessor delivered his farewell address from this chair, and now I am called upon to do the same. And yet, on looking back, I realize that a great deal has occurred during the past twelve months, both in the political and in the social world. There has been a dreadful famine in one part of the world, a disastrous war in another, whilst financial difficulties and a depressed state of trade have been more or less general. At home we have had to contend with strikes and consequent distress amongst large sections of the labouring population, while the middle and upper classes have suffered from the dishonesty of certain foreign states, who, after availing themselves liberally of our pecuniary assistance, have not thought it necessary to pay their debts. There has then been more or less want amongst all classes of the community, and I doubt whether even dentists have escaped. But whatever have been the troubles of

the outer world, the Odontological Society has not been affected by them; the Treasurer's report shows that the Society is in a thoroughly healthy state, both numerically and financially, and I congratulate the Members on that fact.

A review of the work done during the past session is, I think, equally satisfactory. Some excellent papers have been read, and have been followed by interesting and instructive discussions. First, Dr. Arkovy gave us a valuable paper, the result of much painstaking investigation; then Mr. Weiss gave us a carefully prepared summary of published cases on the swallowing of artificial teeth, in which he showed that this accident was more common than had been previously supposed, and gave some valuable hints as to necessary precautions, and the best recorded methods of treatment.

Mr. Moon's paper was an important one, both in itself and on account of the interesting discussion which it elicited, in the course of which Mr. Jonathan Hutchinson gave us the results of his inquiry into the effects of syphilis on the teeth, to which he has, for some years past, devoted much valuable time and thought. Then Mr. Ashley Barrett favoured us with a useful and instructive paper, and Mr. H. Hutchinson gave us the results of his method of curing alveolar abscess by means of carbolic acid, and read the notes of cases thus

treated. I may add that, in my opinion, notes of actual cases give weight to any communication, and are far more valuable than any mere general expression of opinion can be.

The casual communications have been quite up to the average in interest and importance, and several most useful and ingenious contrivances have been brought under the notice of the Society; such, for example, as Mr. Hunt's adaptation of Morrison's engine and Mr. Claude Rogers' saliva-pumps.

My predecessor was able to state in the course of his address that not a single death had occurred among the members of the Society during his year of office. I cannot say the same, but, fortunately, our losses have been few. Two ordinary members have died during the year,—Mr. F. Bradley and Mr. George Bennett; the latter, especially, will be generally regretted, for he had been a member of this Society for many years, and was widely known and respected by the members. In Sir William Fergusson we have lost an honorary member, who was not only a surgeon of exceptional skill and experience, but also a most genial and kind-hearted man, and one who, notwithstanding his high position in the medical profession, was always ready to assist his junior brethren.

The Treasurer's report shows that the Society is flourishing, and I trust it may long continue to flourish. But this room must be kept as neutral ground, where all who are interested in the progress of dental science may meet and debate with advantage to themselves and the profession: the discussions must maintain their scientific character, and political questions must be carefully excluded. So long as this important point is kept in view, I see no reason why the Odontological Society of Great Britain should not have a long and prosperous career before it.

In conclusion I have to thank you most heartily for the honour you have done me in electing me a second time to fill the office of President: I have also gratefully to acknowledge the courtesy of the officers and members of the Council, which has done much to lighten my duties, and to express the satisfaction I feel that, if the recommendation of the Council be agreed to, I shall resign this chair into the hands of so able and popular a successor.

Mr. Underwood rose to express, on behalf of the members, their gratitude for, and appreciation of, the time and attention which the President had devoted to the affairs of the Society during the past year. He wished to thank him most heartily for all he had done and to assure him that all the members, without exception, were his sincere well-wishers.

The President thanked Mr. Underwood and the members generally for their good wishes : he had endeavoured to perform the duties of his office to the best of his ability, and was very pleased to find that his efforts had been appreciated.

Mr. Ashley Barrett proposed a vote of thanks to the Treasurer : he felt sure that the satisfactory report they had lately heard from Mr. Parkinson was in great part due to the careful way in which he looked after the Society's finances.

Mr. Parkinson thanked the Society, and hoped he should be able to give as satisfactory a report next year.

Mr. West thought that the thanks of the Society were due to Messrs. Turner and Coles; they were two of the most energetic and assiduous Secretaries which the Society had yet had, and he hoped it might always be able to meet with their equals.

Mr. Turner replied on behalf of his colleague and himself : he was glad of the opportunity of acknowledging his obligation to Mr. Sewill : having been suddenly called upon to undertake the duties of Secretary, of which he had little experience, he was greatly indebted to Mr. Sewill for the kind way in which he prompted him at the outset and explained all his difficulties.

Mr. Vasey proposed that the thanks of the Society be given to the Librarian and Curator. They were two valuable officers, and he could assure them that their services were thoroughly appreciated.

Messrs. Rogers and Tomes having briefly replied, the Scrutators presented their report and the President announced that the list of officers recommended by the Council had been unanimously elected.

The President then declared the Meeting "Special," and requested that all who were not members of the Society would retire.

The visitors having left the room,

The Chairman said,—Gentlemen, we have now to consider the following bye-law which has been recommended for adoption by the Council: "That after January 1st, 1880, no person be admitted a candidate for the Ordinary Membership of the Odontological Society unless he possess the Dental Diploma of the Royal College of Surgeons, or such other qualification in Dental Surgery, Medicine or Surgery, as the Council may deem sufficient." I may state, for the information of the more recently elected members of the Society, that this proposal has been mooted in the Council for years. Ten years ago, after much previous deliberation, a similar resolution was brought forward at a General Meeting by Mr. Thos. Rogers; but although it was generally admitted that some such measure was desirable, it was thought that the Society was not then sufficiently strong to take such a step without some risk of damaging its immediate prospects, and that the proposal was therefore premature. Since that time the numerical strength and the influence of the Society have greatly increased, and during the past year the Council has carefully reconsidered the matter, and has come to the conclusion that the time has now arrived when the possession of some legally recognized guarantee of competent knowledge—a diploma in fact—may reasonably be expected of all candidates for the membership of this Society. With this brief statement of the history of the measure I leave the matter in your hands.

Mr. Underwood wished to draw the attention of members to the fact that during the coming Session a measure would be

brought before Parliament, which would have a most important influence on the future prospects of the Dental Profession. A Bill would be introduced which would enable three important medical corporations—viz., the College of Surgeons of Edinburgh, the College of Surgeons of Ireland, and the Faculty of Physicians and Surgeons of Glasgow—to grant licenses in dental surgery. He thought that, under these circumstances, it would be more courteous for them, as the representatives of the Dental Profession, to postpone the consideration of this law until they could include these Corporations by name, and not to compel their licentiates to obtain admittance to the Society by virtue of an appended clause or rider of very indefinite signification. The proposal had remained in abeyance for some years,—its further adjournment for a few months could do no harm to the Society; he would not, therefore, enter into the merits of the question, but would simply move the following amendment—"That the consideration of the proposed bye-law be postponed for the present."

Mr. Vasey said he would not generally oppose any proposition emanating from the Council, and he knew how carefully it had considered this particular measure. But he had been so much impressed by the justice of Mr. Underwood's remarks that he should feel it his duty to vote for the amendment. As by the terms of the motion two years would elapse before it would come into operation, it might be passed just as it stood at the end of the Session, or even next year, and the only consequence of the delay would be a shortening of the period of grace.

Mr. Oakley Coles thought that there was something to be said in favour of immediate action. The Council had considered the whole question most carefully, and had brought forward the motion in no captious spirit. Certainly there was in the Council no such feeling of opposition to the Corporations as Mr. Underwood seemed to infer. It was only within the last week that the executive of the Dental Reform Association had been able to state positively that their Bill would be sup-

ported by the Corporations, whilst the Council had had the matter before it for nine months, and had given ample notice of their intention to bring forward this resolution. He did not see that any sufficient reason had been given why they should withdraw it.

Mr. Charles Tomes said he was most strongly of opinion that it would be for the benefit of the Profession and of the Society that some such law as the one proposed should be passed. But he thought also that the introduction of such a measure at the moment when the Legislature were just about to consider the whole question of dental qualifications was inopportune. On the other hand, he did not wish to see the motion shelved for an indefinite period, and he would suggest that some date be named in the amendment at which the subject should be again brought before them—say "till the end of the Session," or "till the next Annual Meeting." If, when that time arrived, the present difficulty had not been disposed of, the question might be again postponed.

Mr. Henry Barrett said he could not see that it would be any slight to the Corporations if the law was passed as it stood. The Bill, if it was passed, would only increase the number of dental diplomas, but would not affect the value of the existing diploma of the College of Surgeons. The names of the other colleges could easily be inserted later, whenever they succeeded in obtaining the powers they were about to apply for. He did not think that there was any occasion to wait for this event; no one knew what might be the pressure of Parliamentary business during the coming session. He advocated that the meeting should vote on the motion.

Mr. Ashley Gibbings suggested that if the adoption of the bye-law was postponed till after the passing of the Act, it would be more difficult than ever to exclude unqualified men from the Society, since, by the Act, all existing practitioners, whether qualified or not, would be legally recognized and registered.

Mr. Thomas Rogers said he had always wished that some such measure as that proposed should be passed, but he should

not have chosen the present moment for the purpose. His objection to the rule as it stood was that it left too much to the discretion of the Council; as the component members of that body were constantly changing, so the opinion of the majority might vary from time to time, and thus the application of the rules might not be always consistent. Of course it would be open to the Society to amend the law later on by inserting the names of other licensing bodies, but he agreed with the previous speakers, that it would be better to wait till matters were settled, and then to pass one well-considered rule, rather than to patch this one by a series of partial amendments.

The CHAIRMAN said he could not see how the proposed Bill affected the question before them. Their rule would not in any way clash with the legislation which they were assured was in prospect; for it merely affirmed the principle that a diploma was necessary, whilst it allowed the Council free scope for the consistent application of this principle. He thought that the prospect of the Act being passed during the coming Session was, to say the least, very doubtful; certainly it was not likely to receive much attention from the House just at present. He could only repeat that the resolution had been brought forward by the Council after the most earnest deliberation; it was, however, for the members generally to decide whether they would accept it or not.

Mr. GADDES said that as the Society was asked to defer the consideration of this rule, on account of a measure which was to be introduced into the legislature, he would remind members that there was another larger measure looming in the distance—the "Conjoint Scheme." If they deferred action on account of this proposed Bill, why should they not afterwards be asked to defer it again on account of the Conjoint Scheme, which, if it became law, would override all the existing licensing bodies. If they were to wait for the passing of the one measure, it would only be consistent to wait for the passing of the other. If these licensing bodies should obtain the power to grant

diplomas in Dental Surgery, the wording of the bye-law was sufficiently comprehensive, and not in the least uncourteous towards them. Besides, the Society, as such, knew nothing about this Bill; it had been kept altogether private, or, at all events, had never been submitted to the notice or approval of the Society, and therefore he did not see why they should take the Dental Reform Committee into consideration, or postpone the adoption of the bye-law.

Mr. Vasey said he hoped that the Society would understand that no discourtesy had been intended by the Dental Reform Committee. They had had to deal with various slowly-moving Corporations, all acting independently and at a distance from each other; the negotiations had consequently been tedious, the issue had been doubtful almost to the last, and they had only just been able to arrive at a satisfactory agreement. It had been, in fact, only within the past week that the Committee had had anything definite to bring before the notice of the Society. The fact that Parliament had been summoned so much earlier than usual had also added considerably to their labours.

Mr. Ashley Barrett suggested that it would probably solve the doubts of many members if they could be informed whether the adoption of this rule had been unanimously recommended by the Council or whether it had only been sent down to them by a small majority.

Mr. Turner answered that Mr. Barrett had no right to inquire as to what had passed at the Council: it would however be evident to members that, when the Council decided the question, it had no knowledge of the important facts which had been stated that evening.

Mr. Dennant said he should support the amendment as being the course most likely to make matters go peaceably and to avoid useless discussion. He had great hopes that the Bill would be passed this Session; it had been placed in the hands of a gentleman of great experience, who had considerable influence in the House, and who had probably secured the

passing of more private Bills than any other member. If it should become law, the status of the Dental Diploma would be greatly changed and a much more favourable opportunity would be obtained for the full discussion of the Council's proposition.

Mr. Charles Tomes wished to ask Mr. Underwood, before the amendment was put to the vote, whether he would not add a date to which the discussion might be adjourned?

Mr. Underwood thought it would be more courteous to the Council not to do so. He would leave it to their discretion, on the understanding that the subject should not be brought forward again until the Legislature had decided the question which would shortly be submitted to it.

The amendment was then put from the Chair, and, on a show of hands, was carried with but one dissentient: many members, however, did not vote.

The Chairman then declared the meeting adjourned until the first Monday in February, when the new President, Mr. Alfred Coleman, would read his inaugural address.

*The Treasurer in Account with* THE ODONTOLOGICAL SOCIETY OF GREAT BRITAIN.

*Financial Statement*, 1876–1877.

| Dr. | £. | s. | d. |
|---|---|---|---|
| To Balance at Bank and in Treasurer's Hands, Oct. 31, 1876 | 299 | 0 | 1 |
| Annual Subscriptions | 369 | 12 | 0 |
| Entrance Fees | 55 | 13 | 0 |
| Arrears | 17 | 17 | 0 |
| Interest on Stock | 31 | 18 | 11 |
| Sale of "Transactions" | 12 | 17 | 6 |
| | £786 | 18 | 6 |

| Cr. | £. | s. | d. |
|---|---|---|---|
| By Rent (one year) | 50 | 0 | 0 |
| Printing and Publishing, including Postage, &c., of "Transactions" | 192 | 9 | 0 |
| Stationery | 5 | 16 | 0 |
| Reporting | 21 | 0 | 0 |
| Refreshments | 22 | 4 | 6 |
| Library and Museum | 9 | 14 | 5 |
| Petty Disbursements | 9 | 7 | 6 |
| Postage and Receipt Stamps, Secretary and Treasurer | 12 | 3 | 6 |
| Investment of Dividends | 31 | 18 | 11 |
| Salary of Secretary | 26 | 5 | 0 |
| | £380 | 18 | 10 |

| | | | |
|---|---|---|---|
| Total Receipts for the Session 1876–7 | £487 | 18 | 5 |
| Total Disbursements ditto | 380 | 18 | 10 |
| | £105 | 19 | 7 |

ASSETS OF THE SOCIETY, OCTOBER 31ST, 1877.

| | | | |
|---|---|---|---|
| Stock in New 3 per Cents | £1,102 | 1 | 3 |
| Cash at Bankers and in Treasurer's Hands | 405 | 19 | 8 |
| | £1,508 | 0 | 11 |

STATEMENT OF DEATHS AND RESIGNATIONS OF MEMBERS, AND NEW MEMBERS ELECTED DURING THE SESSION 1876–77.

| | | |
|---|---|---|
| Subscribing Members—Resident | 101 | |
| „ „ Non-resident | 189 | |
| | | 290 |
| Honorary „ | | 30 |
| Corresponding „ | | 21 |
| TOTAL | | 341 |

| | |
|---|---|
| Deaths | 2 |
| Resignations | 4 |
| Removed by Council | 1 |
| TOTAL | 7 |

| | |
|---|---|
| New Members elected—Resident | 7 |
| „ „ Non-resident | 16 |
| Honorary Members | 4 |
| TOTAL | 27 |

OCTOBER 31st, 1877.

| | |
|---|---|
| Number of Subscribing Members—Resident and Non-resident | 290 |

OCTOBER 31st, 1876.

| | |
|---|---|
| Number of Subscribing Members—Resident and Non-resident | 268 |
| Increase | 22 |

# ORDINARY MONTHLY MEETING,

*February 4th*, 1878.

ALFRED COLEMAN, Esq., President, in the Chair.

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The Minutes of the previous Meeting having been read and confirmed, the following gentlemen were proposed for election:—

Mr. George Augustus Courtenay Benham, 155, Woodhouse-lane, Leeds, Yorkshire, Non-resident.

Mr. Charles Sibthorpe Bright, L.D.S., R.C.S., 14, Via Assalotti, Genoa, Italy, Non-resident.

Mr. John Laws, 125, St. George's-road, Bolton, Non-resident.

The following gentlemen were then balloted for, and elected Members of the Society:—

Mark J. Bloom, 23, Westland-row, Dublin, Non-resident.

George Brunton, Leeds, Non-resident.

Charles Norman King, 7, Bedford-circus, Exeter, Non-resident.

Henry Augustus King, 7, Bedford-circus, Exeter, Non-resident.

Thomas Murphy, Moss House, Bolton, Sunderland, Non-resident.

Thomas F. Pedley, 9, the Terrace, Camberwell, Resident.

James Cowan Woodburn, 275, Sanchiehall street, Glasgow, M.D., S.F.P.S.G., Non-resident.

During the progress of the ballot Mr. J. S. Turner rose to explain a matter personal to himself, which was, perhaps, of small importance, but which he did not like to pass without notice. In the last number of the Transactions he was reported to have said, in answer to an inquiry from Mr. Ashley Barrett, that "Mr. Barrett had no right to inquire as to what had taken place at the Council." The answer as it stood seemed scarcely courteous, and if, on the spur of the moment, he had used those words, he thought it only right to apologize to Mr. Barrett, and to the Society.

Mr. Ashley Barrett said that whether Mr. Turner had used these words or not, he certainly did not speak in an uncourteous manner. He himself had no sooner uttered the question referred to than he felt it could not be answered as he wished : he took Mr. Turner's remark, therefore, simply as a statement of fact.

The President then delivered the following address :—

GENTLEMEN,

I THANK you sincerely for the honour you have done me in exalting me to the Presidency of this Society; a position, however, which involves such responsibilities, and for its successful occupation demands so many qualities I know myself to be wanting in, that I should assuredly have declined the responsibilities and the honours but for two considerations, firstly, that I feel confident the qualities I lack will be more than supplied in my colleagues, the officers and Council who nominated me for the post, and, secondly, that I may assuredly count on your forbearance in regard to my shortcomings.

The year of my presidency is one likely to be eventful in the chronicles of Dental history, for though I can hardly venture to believe that so important a measure as that now before Parliament will ere a year passes become the law of the land, yet in that period, doubtless, will be determined the important question, viz., whether Dental Surgery shall become a legally recognized profession or

continue to exist a business or trade. Now although this Society does not, and I think most wisely, individualize itself in political movements, yet I may venture so far as to pronounce, that I am convinced the majority, if not all of its members, sincerely desire the former, and not the latter condition; and as to the public at large there can be no question as to which is for its interest. It would be unreasonable to expect that a measure of such importance should meet the views and wishes of all parties concerned, and whilst some will see in it a clear gain, others will doubtless perceive in it some loss. If, however, the measure be essentially good and for the general weal, it will become one and all to unite in bringing it to a successful issue; on the other hand, I have no reason to doubt but that those who have so energetically forwarded the work to its present advanced stage, will listen to any reasonable suggestion, and concur in any alteration which may be shown to render the measure more perfect or more just.

To turn to matters which more intimately concern our Society, viz., the furtherance of Odontology, under which we include Dental Anatomy and Physiology, also Dental Surgery and Pathology, and some other subjects bearing upon these. In regard to the first two divisions, I cannot but regret we count amongst our members so few workers in

these departments of Science. Fortunately the work of one of our members has been so excellent and so original that he has redeemed us from reproach; let us hope he will continue his valuable investigations, and occasionally, as heretofore, make this Society the medium for publishing his results, and also that others may be found competitors in the same field, to which he, I am sure, will be the last to object.

The subject of Dental Surgery opens, to my mind, a question of considerable importance, and one not unattended with feelings of some anxiety; feelings which have been intensified by the perusal of some really excellent letters which have of late appeared in the Dental Journals; the matter can, I think, but be best put in the form of a query, thus, —"Are our efforts to cope with dental diseases in the present day commensurate with their rapid increase and altered character?" believing as I do, in common with the writers alluded to, that this query must be answered in the negative, it becomes natural to inquire whether this arises from any want of skill, energy, or perseverance on the part of those who undertake the treatment of such diseases, or whether it results from any want of means or appliances equal to the emergency. Now I think if one thing be obvious in regard to Dental Surgery in the present day, it is the fact that dental practitioners are both in general know-

ledge and skill vastly in advance of what they were even a few years ago; indeed we could fairly challenge any comparison which could be made between the conservative efforts in Dental as compared with General Surgery; to any sceptic on this point, I would recommend a visit to our Dental Hospital in order that the work of the demonstrations in gold filling, as now conducted under its present efficient supervisor, may be witnessed and tested; but in speaking of the skill attained in manipulating with gold especially, I should fail in justice were I not to acknowledge the debt of gratitude we owe to our American *confrères*, who have most certainly been our pioneers and chief guides in this direction; yet nevertheless, and notwithstanding all this skill, ingenuity, and perseverance I much doubt if our efforts are (indeed, I believe they are not) attended with as successful results as they were some twenty or forty years ago, and under far less favourable conditions as regards at least skill, material, and appliances. Now it seems ungracious to attack an old servant because the conditions of his service have so altered that his capacities are no longer equal to the requirements, one, too, that so well fulfilled its duties as at one time to be pronounced, by many, the only material suitable for filling teeth; but this has again and again had to be modified, until a suspicion has arisen that ere long if the work is

to be carried on so as to maintain its long-deserved conservative reputation, the use of gold must be confined to the exceptional, and not the generality of cases. I know I am treading on delicate ground, for it is hinting at the uselessness of that skill of which the possessors may feel justly jealous, but I cannot but believe if the same energy and talent which are now being expended in making one agent to meet the rapidly growing wants of our age, were directed to the same extent in seeking another better adapted to its altered requirements, we should be more successfully advancing Dental Surgery. I wish I could offer some practical hint, or point out the path likely to lead to this desired end. I will only remark, that if to one of our most, if not the most, untrustworthy agent we employ we could give trustworthiness, *i.e.* of rendering it insoluble in weak acid or alkaline solutions, or indeed perhaps in neutral solutions, we should be in the possession of something more approaching our "Philosopher's Stone."

Closely connected with this question, based as it is upon the subject of dental degeneracy, is the still more important one evidently gaining ground that the teeth are becoming obsolete; and if so, are we but attempting to prop up antiquated and degenerate institutions? This is a question we shall some day have to face, but in the interim, suffering humanity calls for help.

Under the head of Dental Pathology, a censure, and, I fear, a not wholly unmerited one, hangs over our own; with a disease occurring on the very surface of an organ, fairly exposed to view, and which may be watched from its very commencement to its close, we are yet amongst ourselves wholly undecided as to its true nature and cause; and assuredly no disease has ever been honoured with so many and varied theories as has Dental Caries. Surely there exists amongst us some master mind who can deliver us from this reproach, some member of our Society, let it be, who with facts unassailable, with arguments incontrovertible, shall demonstrate one of the present, or some new view to be so true, that there shall no longer exist the necessity for a *theory* of Dental Caries; and may this be accomplished in the year of grace 1878.

Another matter hardly coming under any of the heads I have named, although closely connected with some of them, is the treatment of Dental Irregularities. It is a very important department of our calling, and certainly an increasing one, yet becoming daily more difficult to deal with on account of the mischief our very means of treatment induces; the weaker teeth of the present race suffering so much from the effects of plates and other mechanical appliances. Still, in regard to the subject generally, there are some points on

which it were well we were a little more in harmony. I know the impossibility of attempting to lay down general rules in matters where so many considerations must enter into our calculations, yet I cannot but think we should be able to arrive at some general opinions in regard to the subject were we to adopt the suggestions of our esteemed curator, and bring before the Society cases illustrating treatment from beginning to end, and by end, I would argue, he meant not merely the discontinuance of a plate, but the actual result some four or five years subsequently. I am often distressed at the appearance of cases I gloried in some three or four years previously, and especially cases treated conservatively to an extreme degree. I do hear of practitioners who expand, or profess to expand, a dental arch in six or eight weeks so that erratic canines slide down into ample space where none previously existed. How about such cases in three or four years' time if the treatment be *not* continued? and how about the condition of the teeth themselves if it have been? Some such points in regard to treatment by expansion or removal of teeth might, I think, with much profit occupy the Society's attention.

Gentlemen, these observations have been made to show that we have by no means exhausted the subjects most profitable for the Odontological Society to consider and discuss, we have indeed

abundance of material in hand, far more than our eight ordinary meetings in each year can consume, yet it does occur at times that we lag for it, and our worthy secretaries have to undertake the somewhat ignoble work of press-gang, the results of which often, I think, illustrate the proverb connected with volunteers and those so obtained. Such being the case, we do, I fear, want more earnest workers amongst us, and such as will pursue their investigations to ulterior conclusions; we often relinquish our work at the very time we should most pursue it; it is the deserted mine that has often yielded the greatest treasure, and for the encouragement of such, let me beg those who from want of time or inclination cannot enter their lists, to at least support them by their presence on the eight evenings we devote to the furtherance and advancement of Odontology.

Mr. VANDERPANT exhibited a cast of the lower jaw of a boy, aged 7, showing union between a lateral and a central deciduous incisor.

Mr. CHARLES JAMES FOX showed, for Mr. Walker, a cast of a negro's mouth, in which there was transposition of the lateral and central incisors.

He also showed an upper molar, the fangs of which were hooked at the extremity.

Mr. READ showed two specimens of twin teeth. In the first case, a superior lateral incisor and a supernumerary tooth had been united, but Mr. Read separated them during extraction, which was rendered necessary by overcrowding. In the second case, the union was between the upper central and lateral deciduous incisors: it had been extracted to make room for the eruption of the permanent central incisor. Both these abnormalties had occurred in female patients.

The PRESIDENT remarked that, in his experience, the least uncommon position for twin teeth was that which Mr. Vanderpant had spoken of, viz., union between a lateral and central incisor in the lower jaw.

Mr. READ then read notes of a case of fracture of the right upper central incisor which he had treated in a novel manner. The patient was a boy, aged 12, who had broken the tooth by a fall on his face on the pavement. He had first applied to Mr. Henry Moon at Guy's Hospital, and had been sent by that gentleman to the Dental Hospital for special treatment. The tooth was broken across about $\frac{1}{12}$ inch from the neck, and the pulp was exposed. He first came to the hospital on the 7th ult., and an examination having been made, he was told to come again the next morning, that he might be put under the influence of nitrous oxide and have the pulp effectually destroyed, since the tooth was broken in such a way that it

would have been very difficult to have kept a dressing *in situ* for that purpose. But meanwhile Mr. Read, having thought over the case, had come to the following conclusions,—that in all probability, considering the boy's age, the fang of the tooth was not yet fully developed, and therefore the pulp-chamber would not be closed in, so that the attempt to destroy the pulp and save the root might very possibly end in failure. He therefore adopted the following treatment :—

First, he destroyed the portion of pulp which protruded from the pulp-chamber with pure nitric acid : this caused but little pain. Blood flowed freely from the remaining portion of the pulp, and the bleeding was encouraged by holding warm water in the mouth. He then filed the surface of the stump perfectly flat, and, having slightly enlarged the orifice of the pulp-cavity, he drilled round it a few very fine retaining points.

Then placing a piece of blotting-paper saturated with carbolic acid in close contact with the pulp, he placed on this a layer of osteo, kept in position by the retaining points he had just drilled.

Mr. Read's next consideration was to make and fix, *in situ*, a metal cap to keep the previous one secure, and to make the root useful to bite upon, &c. This he accomplished in the following manner:—He first drilled with a very fine instrument six holes on the broken surface of the tooth, keeping just within the margin of the enamel, and then undercut these with a fine inverted cone drill ; then, using the holes as retaining points, he built up a cap with Dr. Slayton's sponge amalgam as high as possible, without letting the lower incisors bite upon it when the jaws were closed. The boy did not complain of any pain during the operation, nor had he suffered any during the month which had elapsed since. The boy was then brought into the room, and the result of the treatment was inspected with evident interest by the members present.

The PRESIDENT remarked that the case was very interesting, in the first place as an example of what he might term extreme conservative treatment; the great object was, of course, to

preserve the pulp until the fang was fully developed, and this Mr. Read seemed to have succeeded in doing by his very ingenious plan of treatment. Secondly, the case was interesting on account of the use which had been made of a new material which had been submitted by the inventor with great modesty to the judgment of the profession, and which would, he thought, prove to be useful.

Mr. Ashley Barrett said that Mr. Read's mention of Dr. Slayton's stopping prompted him to ask whether Mr. Read would inform the meeting what success he had met with in the use of this material in other cases. His own experience of it was that it possessed some of the inconveniences of amalgam, without its advantages; for, whilst it was very soft and apt to become discoloured, it required nearly as much time and labour in working as gold-foil itself.

Mr. Read answered that he had lately used Dr. Slayton's stopping rather extensively, especially in cases which he hoped to be able to watch; several of the students, for instance, had had teeth filled with it. It was true that the stopping did not keep its colour when used for interstitial cavities, but it only required a little friction to keep it bright, and it was superior to amalgam in this respect, that it did not discolour the tooth. It was not so hard as gold, but it was certainly easier to work; it was, in fact, very adhesive, and did not require kneading, like gold: whenever the softness was likely to be detrimental, the stopping could be capped with a layer of gold. Of course it was as yet too soon to give a very decided opinion as to its merits, but he thought it would prove useful.

Mr. Thomas Rogers said he hoped Mr. Read's patient would not be lost sight of, as he should be glad to hear something of the ultimate result of the treatment adopted. He was not quite sure whether it would not have been better to have extracted the root: he knew that all the books were against extraction, but he had seen two cases in which this course had been followed with advantage. He thought a good deal depended on the direction of the canines: if these were

divergent, it was better to extract the stump, and to bring the remaining incisors together.

Mr. Moon said that in this case it was certainly most desirable to save the stump if possible, for the boy had a very prominent lower jaw, and the falling in of the upper incisors, which would have followed the extraction of this tooth, would have been a source of great inconvenience to him. He also should watch with interest the result of the present treatment. He had suggested, when he sent the boy to that hospital, that the pulp should be destroyed, and a gold tube inserted into the root, on which an artificial tooth could have been fixed by means of a pin. He thought that plan of treatment would have been tolerably safe, but was quite willing to give Mr. Read due credit for the patience and ingenuity he had displayed.

Mr. S. J. Hutchinson said he had not as yet used the new filling to any extent in practice, but some experiments which he had made with it out of the mouth did not altogether confirm the statements of the inventor respecting the rapidity and ease with which it could be worked: he had found that it took as long to work as gold; and when finished it was not as hard as gold, or even as osteo.

The President remarked that it was of course necessary to be cautious in expressing one's opinion of new materials; it was very desirable that each should have a fair trial; but cases should be selected in which the result could be watched, and any failure easily remedied. The public could not complain when they tried experiments on their own persons or on students of the hospital. He was himself disposed to think well of Dr. Slayton's stopping, and he would suggest that the very opposite opinions which had been expressed regarding it, must be due to some difference in the mode of working.

Mr. Charles Tomes said he had to show an example of dental pathology on a large scale. The specimens he held were balls of secondary dentine which he had taken from the

tusk-socket of an elephant. The tusk had been sent to him to describe by Sir Victor Brook : the fellow to it, which was also in that gentleman's possession, was the largest which had ever been taken from an Asiatic elephant ; it measured nine feet in length, and weighed 120 lb. That which he was about to describe measured only three feet long, but its girth was considerable, and it was heavy in proportion to its size. Its free extremity was abruptly truncated, and ended in a cup-shaped hollow : running backwards along one side of the tusk was a fissure which had healed over. The axis of the tusk was formed of secondary dentine : this was true of all tusks, but normally the amount of secondary dentine was very small, whilst in this case it formed a large proportion of the tusk, and, owing to its comparative softness, was the cause of the cupped extremity.

Just within the socket the tusk was broken transversely, but the fracture was not quite complete : it had not united, but was mended on the inside by the blocking up of the pulp-cavity with a sort of splint composed of secondary dentine ; the rest of the socket was filled up with irregular masses of secondary dentine similar to those now shown.

The explanation of this state of things he took to be as follows :—Many years before the death of the animal this tusk had been broken off at the level of the socket, and the part within the socket had been split.* The animal had, however, recovered from this injury, the tusk had continued to grow, and the longitudinal split had healed. But at a subsequent period the tusk had been broken again just within

* Since giving the above description I have been informed by Mr. G. P. Sanderson, who has had great experience in the capture and care of elephants in Southern India, that at the time of the original accident this elephant must have been quite young, or the whole of the tooth outside the socket would have been solid and without a pulp-cavity, so that the fracture would have led to less disturbance : as the eye of the animal shows it to have attained great age, the duration of the pathological process was the greater part of its lifetime. Inflammation and destruction of the pulp often follows the sawing of the tusks of captured elephants if this be done too near the socket in a young animal.—C. S. T.

the socket; the animal had lived for some time after this injury also, but it had put a stop to the normal growth of the tusk, these masses of secondary dentine having been produced instead. The case was interesting as showing that the tooth pulp may be subjected to a considerable amount of injury without putting a stop to the formation of tolerably normal dentine; and again to still further injury, arresting the formation of secondary dentine (*osteo-dentine*).

Mr. Thomas Rogers said that the case was also interesting to himself personally on account of the light it might possibly throw on a theory of his own, which, if it should prove to be true, would exercise considerable influence on the treatment of diseased pulp. His idea was that if ever the layer of odontoblasts be injured, no fresh dentine could be formed, since no second layer of odontoblasts ever appeared. Could Mr. Tomes give him any information on this point?

Mr. Tomes answered that he was sorry he could not. The specimen, unfortunately, had not been presented to the Museum, —it had only been sent to him for description; he had therefore only been able to make a superficial examination, and could not cut any sections.

The President then handed round a model showing two supernumerary teeth situated close to the incisors, and resembling malformed bicuspids or molars.

He also showed an apparatus which he had had constructed for the administration of gas and ether: it was an improvement on a similar apparatus which he had exhibited to the Society two years ago. He did not claim any great novelty in the arrangement, but thought it would be found compact, convenient, and efficient.

After the usual vote of thanks the meeting terminated.

# ORDINARY MONTHLY MEETING,

*March 4th*, 1878.

ALFRED COLEMAN, Esq., President, in the Chair.

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The Minutes of the previous Meeting having been read and confirmed, the following gentleman was proposed for election:—

Edward Thomas Payne, 2, Sussex-place, Southampton, Non-resident.

The following gentlemen were then balloted for, and elected Members of the Society:—

George Augustus Courtenay Benham, 155, Woodhouse-lane, Leeds, Yorkshire, Non-resident.

Charles Sibthorpe Bright, 14, Via Assarotti, Genoa, Italy, L.D.S., R.C.S.E., Non-resident.

John Laws, 125, St. George's Road, Bolton, Non-resident.

Mr. Gaddes then read the following account of a case of Hysteria, with unusual symptoms, which had occurred in the practice of Mr. J. R. Garner.

Miss E. H., aged 21, had for some time been suffering acutely from toothache, principally located on the left side and in the upper premolars. As she was in very delicate health, having only recently recovered from scarlatina and diphtheria, I was anxious, if possible, to avoid extracting the teeth, and therefore from time to time applied various anodynes to the

carious surfaces, at the same time advising her to seek in change of air a means of restoration of her general health. However, these means in no way availed; the pain in the teeth continued, depriving her of rest, and altogether aggravating the debilitated condition of her system. She therefore came to me on the 14th April, 1875, stating her resolve to have the posterior tooth extracted, and expressing a wish to have nitrous oxide for that purpose. Her medical attendant was unable to accompany her, owing to numerous engagements, but he had expressed an opinion to her that she might safely take chloroform, and he would have no hesitation in administering it. My gas apparatus happened to be out of order, but wishing to save her the pain and apprehension of the operation, I consented to administer a little bichloride of methylene; I did this the more confidently after the opinion expressed by her medical man. All being in readiness, I measured out half a drachm of methylene (a quantity I had frequently used successfully before), poured it on the flannel bag with which the leather inhaler of that apparatus is provided, and requesting the young lady to breathe calmly and steadily, I applied it (the inhaler) over the nose and mouth. She instantly dashed it away, saying she could not breathe. I said a few words to reassure her, and again applied the inhaler, and she immediately removed it. On advising her to try once more, and endeavour to overcome her fears sufficiently to fall slightly under the influence of the drug, she submitted, and inhaled steadily for a few seconds, her pulse beating regularly the while. Finding her sufficiently insensible, I removed the tooth very easily, the fang being decidedly stunted. She at once leant forward, and with my help rinsed her mouth out with water two or three times in quick succession. I then suggested she should lie back in the chair and quite recover herself. I now noticed her eyes had a fixed expressionless stare, and her breathing became laboured. Her hands were pressed on her bosom, and on asking her how she felt, she replied that she felt "a fearful oppression on her chest." I then asked a young lady (her cousin), who accompanied her, to loosen all her clothes as much

as possible, and freely sprinkled her face and chest with cold water, and applied ammonia to her nostrils. Her respiratory efforts became more and more spasmodic, and her eyes retained their fixed stare. We then removed her to a couch in an adjoining room, but on her attempting to lie down, she instantly started up exclaiming, "I must breathe! I must breathe!" Finding no efforts on my part of any avail, and beginning to be anxious about her condition, I sent off for her medical man: he was away from home, but his brother-in-law, also in practice, was quickly in attendance. I explained in as few words as possible the nature of the case. Dr. Way administered a little sal volatile in water; but the spasms increased in intensity, and the peculiar sound of the inspirations was painful to listen to. Cold water was again applied, her face and chest flicked with a wet towel to rouse her, but without any effect. Dr. Way then applied the stethoscope, and found the spasms proceeded entirely from the throat, the heart being quite uninfluenced. A very small quantity of nitrate of amyl was applied on a handkerchief for her to inhale. But all attempts to restore her met with resistance, and they only seemed to increase her distress. She was then supported between two of us, and walked up and down a garden, and that appeared to have an improving effect on her, but she quickly relapsed; another fit of laboured breathing came on: she dragged the rings off her fingers, throwing her body about in her efforts to breathe, and she became wandering in her mind. After two hours and a half spent in fruitless endeavours to restore her, Dr. Way decided on taking her home during a lull in the attack. A closed conveyance was obtained, and the Doctor, patient, and her cousin went in it. My services would have been of no avail, so I did not accompany them, but I obtained the other particulars from the doctors and parent. In the carriage she was somewhat violent. Arrived at her parent's house, she was assisted inside, and at once intimated by signs that her room should be straightened. Beyond this she took little notice of her relatives, but went up to a photograph suspended on the wall of the sitting-room—a portrait of a lady friend—and inti-

mated her wish to have her sent for at once. That lady soon arrived, had no difficulty in controlling her, and she succeeded in getting her to bed. Miss E. H. told her friend in half-sentences, and with her voice not raised above a whisper, that during the operation she knew all that was going on, and also subsequently, and felt if she could only cry she would be all right. Dr. Way administered hydrate of chloral, and finding it have effect, left her for a short time. He returned after a few hours, accompanied by her regular medical attendant, Dr. Campbell. They then administered a further dose of chloral under much resistance, which seemed to produce no effect. The breathing continued in the same distressing condition, the eyes retained their glassy stare, and the mind was painfully alive to every sound. Every knock or ring at the bell, every footstep in the passage brought alarm with it, and caused her to spring out of bed and cling to the nearest support with a strength which was surprising, considering her otherwise prostrate condition, at the same crying out to take the man away, she would not have her tooth out. As the night advanced, the symptoms became more unfavourable, the hitherto good pulse became wavering and scarcely perceptible; the extremities became cold. During the night the chloral produced two hours' sleep, but she awoke in the same semi-unconscious state. When the doctor visited her the next morning early, he found the breathing natural again, but she did not seem to recognize those about her, except the lady friend above referred to. A little nourishment was administered with difficulty. She slept three hours, and also slept fairly that night, but the following morning showed no further improvement in her condition, and grave doubts began to be entertained of the issue. However, during the afternoon of that day there was evidence of improvement. Perfect consciousness returned, and she gradually improved until the following morning, four days from the day of operation. But her voice had gone, and all her utterances were in the faintest whisper, and she had quite lost the use of the lower extremities. Her genera health so far improved that in three weeks after she was brought to

me for the purpose of having the remaining premolar extracted, as it affected her rest and helped to retard her recovery. She had to be carried from the carriage to my room, or rather so supported on either side that it was evident she had no power of her legs. I had to place my ear close to her mouth to catch the sound of her faintly whispered remarks. The tooth was extracted without any unfavourable circumstance, and no anæsthetic was used. She went away for change of air, and by slow degrees regained the use of her lower limbs, improving in strength as well; but no improvement was observed in her voice, which continued the same, until one day, six weeks after the event recorded, it returned to her suddenly and completely.

Mr. Gaddes said he thought the case one of considerable interest, inasmuch as the phenomena, if they were purely hysterical, were certainly uncommon. The cause of the aphonia and paraplegia might be somewhat obscure, but it was well known that injury is usually succeeded by a period of depression of all the vital functions, and this may either end in death, pass into a state of excitement, or gradually disappear. In this case the patient was semi-anæsthetized; in which condition there is also partial paralysis of the vaso-motor nerves, and the action of the heart is enfeebled. A painful impression received under these circumstances not unfrequently destroys the power of the already partially paralyzed vaso-motor nerves, causing the great abdominal vessels to dilate, and to become so gorged that little or no blood reaches the heart. Thus, from shock received while the vital functions are much depressed, is cessation of the heart's action, and death liable to take place. These results were carefully worked and published by Dr. Lauder Brunton, and the lesson to be gained from them, and from this case also, was, that it is much safer to have the patient thoroughly anæsthetized during any operation, rather than give a small dose of an anæsthetic, as he feared many practitioners were liable to do.

The PRESIDENT remarked that the case was interesting as an example of what any of the members present might at any time be called upon to deal with. Cases of Hysterical Mania, such as this evidently was, were certainly rare, but no dentist could be in practice for a few years without meeting with several differing from this only in degree. He could not agree with Mr. Gaddes in thinking that the administration of too small a quantity of methylene was the cause of the attack, for precisely similar symptoms had occurred in cases where no anæsthetic had been used; he should rather ascribe it to the shock of the operation acting on the over-sensitive nerves of a delicate girl whose strength had been reduced by previous ill-health and long-continued pain. As to the treatment of such cases the great point to be remembered was that the slightest appearance of sympathy was bad for the patient; she must be commanded with firmness and decision, and her whims must on no account be given way to. It was however necessary to make sure first of all that the case was really one of hysteria, and it was sometimes a little difficult to distinguish the hysterical symptoms from those due to more serious causes.

Mr. VANDERPANT said, that in the course of ten years of practice he had met with several cases in which hysterical symptoms had supervened after the administration of nitrous oxide gas. The most serious was that of a young lady aged twenty, to whom he gave gas to facilitate the extraction of some molar stumps. She had not previously shown any symptoms of hysteria, but immediately after this operation she became most violent, and screamed without cessation for upwards of two hours. Fortunately she had brought her medical attendant with her; this gentleman particularly insisted on the importance of firmness in dealing with the patient, but his firmness had not much effect, for it was only after she had lain for three hours on the floor of his anteroom, had made a great deal of noise, and had been liberally drenched with cold water, &c., that she recovered sufficiently to be removed to her home: she afterwards stated that she had felt no pain whatever during the removal of the stumps.

Mr. Ashley Barrett suggested, in reference to the difficulty in the diagnosis of which the President had spoken, that a knowledge of whether the patient were married or single would be of some assistance; if the patient were single, the presumption would be in favour of hysteria; if married, then rather against that view.

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Mr. Claude Rogers exhibited a lamp which he was in the habit of using whenever he was compelled to work by artificial light. It consisted of a glass globe filled with water, one of those commonly known as "jewellers' globes," supported on a sort of tripod, and behind this was a jointed gas-bracket movable in all directions. A beautifully white light could be obtained by adding a little sulphate of copper to the water, and its intensity could be increased by fixing a reflector behind the gas jet.

The President said he had seen a very similar apparatus, some years ago, in the possession of Mr. Gibbons, of Brighton, and he believed that was a copy of one belonging to Mr. Woodhouse. A bowl of water with a candle behind it was often used by lacemakers. He trusted that the younger members of the profession would not be tempted by the use of such contrivances, to work too many hours at a stretch: he thought that working by artificial light, if persisted in, would be found very detrimental to the sight.

Mr. Hutchinson thought that all arrangements for concentrating the light were a mistake. In the first place the strongly marked shadows thus formed were very objectionable; and in the second, heat was concentrated as well as light. This last drawback could be obviated by using a saturated solution of alum instead of pure water. He himself much preferred a good diffused light: they found a diffused light best in the daytime, and the object should be to get as good an imitation of that as possible. He found a Silber gas-burner answer the purpose best; it gave a very steady, white, diffused light.

Dr. FIELD said he strongly objected to working by artificial light, and only did so under exceptional circumstances. But he did not share Mr. Hutchinson's partiality for diffused light; even in working by daylight he preferred the direct light of the sun to the diffused northern light in which most operators delighted. For the first ten years of his practice he had occupied a room with a northern aspect, for the last five he had occupied one looking south, and he found this far preferable. The south light was steadier under all conditions of atmosphere, and on obscure days, which were sufficiently numerous in this climate, it was often possible to work in a south light when it was impossible to do so under a northern aspect. In working by lamplight he did not reflect the light directly into the cavity, but indirectly by means of a mouth mirror, and he thus got rid of the dark shadows which Mr. Hutchinson had found so troublesome; but if gold had to be used, the reflection from it was very trying to the eyes, and this could not be obviated.

The PRESIDENT said, that in these matters a great deal depended upon habit. One of his friends always worked with a south-west aspect, and the fact that an additional twenty minutes of daylight per diem were thus gained for six months in the year was worthy of consideration.

The PRESIDENT then called upon Mr. Charles Tomes to read his paper.

*On some forms of Dentine Calcification, with Notes on their bearing on Dental Pathology.* By Charles S. Tomes, M.A.

To the end that our observations and searchings after truth may be fruitful and yet not wasteful of labour, it is essential, from time to time, to map out the boundaries of our knowledge, and, with no less exactitude to define the areas of our ignorance. Such is the purpose of my paper: I have little that is absolutely new to offer, almost nothing that has not been published elsewhere; I can only hope to put forward, as clearly as in me lies, a few matters for thought, for discussion, and—what is a hundredfold more worth than either—for observation.

But as some of the most significant facts of dentine development have been too recently published to be generally known or to have found their way into text-books, I must briefly describe the several methods in which healthy dentine is built up.

To take first ordinary hard unvascular dentine, such as we know in the human tooth.*

* A much fuller account of the varieties of dentine and their development is contained in a paper by the author,

It was formed by the calcification of a specialised layer of cells,—odontoblasts upon the surface of a pulp. The pulp, vascular and nervous, is encroached upon by this calcification proceeding inwards from its surface on every side; and as the odontoblast layer creeps inward, so do the vessels and the nerves (the large ones at all events) recede inwards before it.

So that when the dentine is complete it contains no bloodvessels, no large nerves; nothing soft but the axial portions of the odontoblasts, which persist as the dentinal fibrils.

With this we may compare the development of typical vaso-dentine.

At the outset there is an exactly similar dentinal pulp; a richly vascular* papilla, the capillary plexus of which is but little beneath its surface, which latter is clothed with an odontoblast layer. Calcification takes place in the odontoblasts, and the odontoblast-layer creeps inwards, but in place of the capillaries receding before it, they remain in position, and become enclosed in the calcifying dentine. Here they remain pervious, and red blood circulates freely through them, just as it did when they formed part of a soft papilla.

In other words calcification has gone on right

" on Vascular Dentine " (*Philosophical Transactions of the Royal Society*, 1878).

* Nothing is known of its nerves.

up to the capillary, so that it has no pulp-tissue around it, but lies in a bony channel of the same calibre as itself.

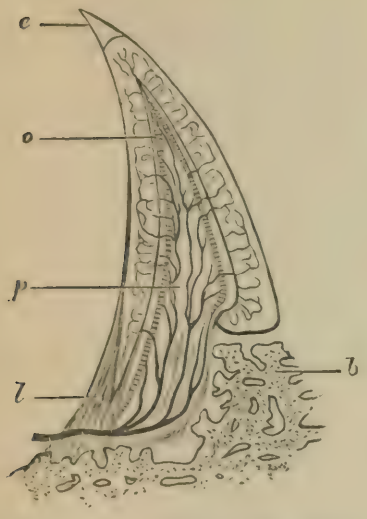


Fig. 1.—Longitudinal section of a tooth composed of Vaso-dentine (Hake) somewhat diagrammatic.

*b*, Bone of jaw.

*e*, Tip of enamel.

*l*, Ligamentous hinge by which it is attached.

*o*, Odontoblast layer.

*p*, Richly vascular pulp.

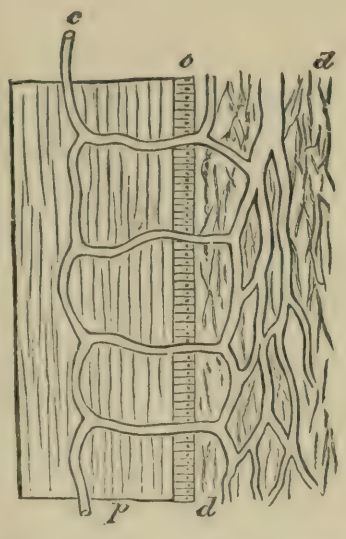


Fig. 2.—Section of Vaso-dentine more highly magnified (from Hake).

*d*, Dentine containing no dentinal tube.

*o*, Odontoblasts.

*p*, Pulp, from the larger vessels of which capillaries (*c*) pass into the substance of the dentine.

In typical VASO-DENTINE no dentinal tubes exist, for calcification goes on in the several odontoblasts to the entire obliteration of any axial channels. But there are many intermediate forms of dentine between typical unvascular dentine and typical Vaso-dentine; thus in the flat fishes the apex of the tooth is hard dentine, merging by degrees into vaso-dentine at the base, the den-

tinal tubes becoming fewer, and finally absent, while vascular canals begin to occur.

Among mammals the great extinct Megatherium had a rich capillary plexus in the dentine; while the Manatee and Tapir have regular but scanty vascular channels in their dentine.

There is yet another variety of dentine, termed PLICI-DENTINE, in which an appearance of much complexity is arrived at by foldings of the odonto-last-layer of the pulp; but the difference between this and ordinary hard dentine is more apparent than real.

In Hard Dentine, Vaso-dentine, and Plici-dentine, which we may term the true Dentines, we have this in common; the hard structure is a product of calcification of a superficial, highly specialised layer of cells,—the odontoblasts.

But in the next variety, OSTEO-DENTINE, there is a great and radical difference. Like the others, it commences by the formation of a thin skin of calcification on the surface of the papilla; but here the resemblance ceases. From the interior of this first skin there shoot down throughout the papilla calcifying processes, which inosculate with one another. By these is the body of the tooth formed, and a specialised odontoblast-layer has nothing to do with it. So that we can pull out the pulp from a hard dentine tooth, or a vaso-dentine tooth, at any period of its growth; but you can-

not pull it out of an osteo-dentine tooth, save at the very first, because calcification has shot through and through it.

Fig. 3.—Section of an osteo-dentine tooth (Pike) with the pulp *in situ*.
*d*, Shell of hard dentine.
*p*, Pulp-tissue.
*t*, Trabeculæ of ossifying material shooting down the rough pulp.

From the foregoing very brief account it will be seen that the formation of osteo-dentine has little in common with that of other or true dentines; nevertheless these divergent forms of calcification may occur in one and the same tooth-pulp, as is exemplified in the teeth of the sheep's-head fish (*Sargus ovis*), in which, after the formation of an upper half of hard dentine, a basal portion of osteo-dentine is developed from and in the same pulp.

There is yet another form of calcification of dentinal pulps,—that in which globular masses,

more or less completely aggregated together, are produced.

Of the details of this process we know absolutely nothing; it is the means by which the pulp-cavity is finally occluded in such creatures as the Sperm Whale; it is known to occur in injured pulps of creatures in which it is otherwise abnormal, and it occurs in pathological growths.

The relation of globular calcification to normal dentine development is beautifully illustrated by the tusk described by me at the last meeting of the Society. There an injured pulp struggled on, producing what was not normal, but yet was a fair similitude of a normal tusk in outward appearance; it receives a second injury, and can do no more thenceforward than form a number of isolated globular calcifications, many of them as large as a swan's egg.

And it must not be forgotten that these globular calcifications differ more in size than in kind from calcospherites, which can be artificially formed, out of the body.

It would seem, then, that we might place these several forms of calcification of dentine pulps in a scale, passing from hard dentine as the highest, through vaso-dentine and osteo-dentine to globular dentine as the lowest and least specialised.

This is in some degree borne out by what we find in such morbid growths as odontomes; in

these I have found vaso-dentine differing from the normal dentine only in so far that capillary tracts persisted in it; then beyond that, farther from the normal tissues, osteo-dentine, and beyond that again globular dentine.

In other words, the tissues produced as morbid structure in the human tooth are normal structure in certain other teeth;—like the famous definition of dirt, they are merely matter in the wrong place.

When, in excavating a cavity, we expose a living and fairly healthy pulp, we cover it in, and, did we but know how, should take measures to induce its calcification at that point; on the other hand, when a patient comes to us suffering neuralgic pain traceable to a sound tooth, we, after excluding certain other possible causes, say that it is due to a calcifying pulp. Now, wherein lies the difference between this beneficent calcification we pray for, and the maleficent calcification we know not how to combat?

Here is a lack of data; we need observations upon the pulps of teeth that have been painless, and upon those that have been painful, carried out with strict accuracy and attention.

As a suggestion, as a mere starting-point for observation, something to this effest might be put forth.

When calcification takes place normally in the

odontoblast-layer, the vessels and nerves recede before it, so that they cannot become involved in it; when, however, calcification, deserting the odontoblast-layer, appears more deeply in the pulp, as it often does in the form of globular calcifications, it is likely that nerves and blood-vessels, which have not receded before it, as in the other case, would be implicated by it, and pain result.

Now, there are very good grounds for believing that normal odontoblast calcification is a process easily upset, and that odontoblasts once destroyed on the surface are not readily reproduced, if they are at all; and if the above suppositions be true, they have a bearing upon the treatment of cases of exposed pulp.

For if odontoblast calcification be the only thing that is useful to our purpose, then that copious sponging of the point of exposure with undiluted carbolic acid, which I suppose all of us have practised with some assiduity, was labour very much misapplied, for carbolic acid coagulates the albumen and shrivels up the odontoblast, tanning it and rendering it incapable of further development. In fact, if my hypothesis be true, in exact proportion to the efficacy of our application will be the mischief we have done.

On the other hand, if any form of calcification that will block the hole will be painless and

answer the purpose equally well, then we need consider nothing but the patient's comfort at the moment, and use any remedy we please, in the confidence that slight maltreatment of the exposed pulp will do nothing worse than induce a lower and ruder form of calcification.

In my own practice I have lately met with a case of severe neuralgia, especially affecting the occipital region, which was caused by globular calcification of the pulp of an upper molar, which had gone on to such an extent that there was but little room for pulp-tissue left; yet the few threads remaining were sufficient to cause intense neuralgia; and to remove all doubt as to the correctness of the diagnosis, I may add that this has happened to two teeth in the same mouth within a year with precisely the same result.

The teeth were not extracted, the remnant of pulp having been destroyed by numerous dressings of arsenious acid, and the globular masses, which were loose, but roughly fitting the pulp-cavity, got out with no small trouble.

To recapitulate, it is my belief that calcification going on in the odontoblast-layer to any extent will probably be painless, for the nerves will, as in ordinary dentine growth, recede before its advance; on the other hand, globular calcifications starting deep in the pulp and in tissue-elements other than the odontoblasts, are likely to press

upon nerves, and so cause pain; these globular masses being practically foreign bodies in the pulp. It would take long to determine this point by the cases which fall under the observation of an individual, but if a dozen of my hearers would for a year take every opportunity of making observations, my hypothesis would be either negatived or confirmed.

To turn to another subject, it is a matter of well-grounded belief that the dentinal fibrils may, under certain conditions of irritation, become calcified, so rendering the dentine solid and homogeneous. This is believed to happen when a surface of dentine has been for a long time denuded of its enamel coat, or, in favourable cases, after caries has been polished away.

It is believed also to happen in that transparent zone which intervenes between caries and the pulp-cavity, though there are points in reference to this not yet thoroughly cleared up, and which can only be cleared up by very minute and very troublesome investigations. But a little light is thrown upon the subject in an indirect way by the structure and development of typical vaso-dentine.

In this, as I have before remarked, the pulp is coated by odontoblasts just like those of a human tooth-pulp, but instead of the axial portions remaining uncalcified as dentinal fibrils, the whole

thing calcifies, and the dentine produced is an impervious mass, with no tubes in it.

This impervious dentine forms the exterior of many teeth, and has no enamel coat to protect it. As a curious instance of compensation, not wholly germane to my subject, I may mention that the vaso-dentine tooth of the trunk-fish (*Ostracion*), which is peculiar in having its capillaries very close to the surface, leaving no room for an impervious layer of any thickness, has a thick coat of enamel instead.

To my mind, the probability of calcification occurring in the human dentinal fibril, and so solidifying the dentine, is heightened by the occurrence of solid dentine in a large number of fish, the formative organs (odontoblasts) being to all appearance quite similar in the two cases. But probability is a very different thing from proof, and I am painfully aware that my paper proves nothing at all. But if I have done ever so little in the way of showing that a favourite study, that of comparative odontology, is capable of offering hints and suggestions for thought to practical men, and so rescuing it from the charge of having no real usefulness save as a mental exercise, I shall be well content.

## Discussion.

The President said that the truly interesting paper which he had just heard had taken him rather by surprise. Mr. Tomes had undertaken, at short notice, to fill a gap in their arrangements; and although he felt sure, when he came down to the meeting that evening, that he would hear something worth listening to, he was scarcely prepared for the long, original, and highly suggestive paper with which Mr. Tomes had favoured them, and he felt at a loss to decide as to which of the many practical suggestions it contained it would be best to dwell upon. He noticed that Mr. Tomes had adopted Kölliker's observations respecting the formation of dentine. There was one point in connection with this on which he should be glad of some information—did the growth of the dentine proceed from one layer of odontoblasts, or from a succession of layers? Mr. Tomes' explanation of the mode of formation of vaso-dentine appeared to him to be original,—certainly it was the best he had met with. The account of the formation of secondary dentine differed slightly from that generally given, but was very clear and satisfactory.

Mr. Gaddes said there were two points in Mr. Tomes' paper on which he should be glad of some further information. In the first place he had spoken of the vessels and nerves getting out of the way of the odontoblasts: could Mr. Tomes tell him how this took place? Secondly, Mr. Tomes had stated that the islands of calcification which were sometimes found in the pulp-cavity caused pain by their mechanical pressure on the nerve-filaments. But if this bone was merely a conversion of pre-existing tissue, and not a new formation, he did not see why it should interfere with the nerve-filaments: did Mr. Tomes think that the deposit of calcareous matter in the tissue was accompanied by increase of bulk?

Mr. WHITE said he was glad of an opportunity of thanking Mr. Tomes for his able paper, to which he had listened with the greatest interest. He could quite confirm the statement of Mr. Tomes that calcification of the pulp might be a cause of pain. His attention had been called to this fact by a case he had met with in practice some years ago: he believed the tooth was still in the Museum. A patient came to him complaining of acute pain in a lower bicuspid; the tooth itself was sound, but was much crowded upon by its neighbours. Thinking this might be the cause of the pain, he relieved the pressure by filing between them. But the pain continued as bad as before, and at last he was compelled to extract the tooth. On filing a small groove, and then splitting the tooth, he found that the pulp-chamber was almost filled by a mass of calcification. The patient had no return of the pain. It was evident that these islands of calcification might cause pain, but he should be sorry to assert that they always did: in temporary teeth, at all events, it was very common to find masses of amorphous calcification when there had been no history of previous pain. He could also indorse what Mr. Tomes had said respecting the effect of strong carbolic acid on the odontoblasts: when applied under the miscroscope, it would be seen that the acid shrivelled them up, and made them very transparent. He thought, however, that the acid might be used so far diluted as to be still capable of preventing septic action, and yet not be strong enough to destroy the vitality of the cells, and thus to put an end to all chance of subsequent calcification. Practically it was but seldom that the whole thickness of the dentine could be removed without some injury being done to the superficial layer of the pulp. When the cavity was out of sight on the distal surface of a tooth, this was almost certain to occur, and then he thought it was best to use the acid strong, since it would not only act as an antiseptic, but as an anæsthetic also. The extremely sensitive nature of this layer was shown by the fact that even in cases where the pulp was not exposed, but where a thin layer of dentine had been left between it and the stopping, the patient was very apt to complain of pain being

caused by the sudden application of heat or cold, or even by changes in the weather: this was, of course, due to the fact that the metal was a better conductor of heat than the dentine was.

The PRESIDENT observed that Mr. Tomes had shown in his paper that secondary dentine might be formed independently of the odontoblast-layer; possibly, therefore, the partial destruction of this layer might not always put an end to all chance of calcification taking place. Still, the occurrence of calcification under these circumstances must be exceptional, because they knew that practically it was no use attempting to cap in any of the cases of old exposure of the pulp which so often came before them, where the odontoblast layer was evidently gone.

Dr. FIELD said he had for some time past abandoned the use of strong carbolic acid and creosote as an application to exposed pulp before capping, because he found that all the cases so treated failed; the tooth became painful, and sooner or later he had to extract it. But with dilute carbolic acid he had obtained good results. In cases where the cavity was out of sight, on the distal side of the tooth, he never used an excavator, since, as Mr. White had remarked, it was very apt to slip and do harm: he always used a burr worked by the engine, and when he approached the pulp-cavity he put on a very fine gold finishing burr: the amount of force and the point of application could thus be regulated with the utmost delicacy and exactness.

Mr. OAKLEY COLES thought it would be impossible to discuss Mr. Tomes' paper satisfactorily in the short time at their disposal that evening: it was besides a paper which required and deserved careful reading and consideration. He would propose, therefore, that the discussion should be adjourned until the next meeting of the Society. In the interval members would have an opportunity of trying some experiments in order to ascertain what really was the action of carbolic acid on the odontoblast-

cells, and at what strength it might safely be used. This was indeed such an important point that he thought the best course would be to appoint a sub-committee specially to inquire into this subject, and to ascertain whether all other antiseptic agents, such as salicylic acid, thymol, &c., act in the same way, or whether any of them might possibly act as a stimulant to bone-formation.

The PRESIDENT said, that in his experience to appoint a sub-committee to inquire into a subject was almost synonymous with burying it. As to the adjournment of the discussion, he was ready to do as the majority of the members wished, but he thought that adjourned discussions had often turned out failures. He quite agreed that the paper deserved to be carefully read and thought over. It contained indeed enough original matter to furnish several papers, and he hoped that Mr. Tomes would, on future occasions, elucidate some of the many points of interest which he had only touched upon that evening.

Mr. ASHLEY BARRETT said there appeared to be considerable diversity of opinion respecting the best mode of treating an exposed pulp. The advice which had been given to him was the following: if any hæmorrhage should take place from the pulp, it had better be destroyed if it did not bleed, an attempt might be made to save it, but the prospect was not very favourable; in many cases pain would supervene, and the attempt would fail. His own experience had been quite in accordance with this expression of opinion.

The PRESIDENT then called upon Mr. Tomes for his reply.

Mr. TOMES said he quite agreed with the President that adjourned discussions generally fell very flat, and he felt obliged to him for having expressed himself against that proposition. He was sorry to say that he could only answer some of the queries which had been addressed to him; the others must wait the results of future investigations. Mr. Gaddes had found a difficulty in accounting for the interference with the nerve-filaments which seemed to be caused by calcification

of the pulp. He himself could not altogether account for it, and therefore he had made no positive assertion on the subject. What he had suggested was this, that as the form of calcification departs from a high and approaches a lower standard, so are we more likely to have mechanical interference with nerve-function. But though several facts seemed to point to this conclusion, he had no positive proof of its truth. Mr. White was surprised that the islands of calcification so often found in the temporary teeth seemed to cause no pain; but he must remember that the pulp of these teeth might be freely exposed without pain being felt: it was indeed much less sensitive than the pulp of the permanent teeth. The President had remarked that although calcification might occur in any part of the pulp, yet experience showed that it was no use capping old exposures on the chance that calcification might take place: this went to confirm the opinion he had expressed, that the normal mode of formation of dentine was the only useful form, *i.e.* from the odontoblast-layer. He had seen a plan of treatment advocated in an American paper, and he believed it was a favourite plan with some practitioners, of touching slight exposures of the pulp with strong nitric acid: an eschar forms, and they cap over this. If this treatment was successful, that was, if benign calcification resulted, his theory was demolished.

The PRESIDENT said he had been in the habit of occasionally using nitric acid in this way and with good results. The effect of the acid was to form a thin film on the surface of the pulp, leaving the part beneath quiet and healthy, but he had no proof that calcification had ever taken place after this treatment.

After thanking Mr. Tomes and other contributors, the President called attention to some excellent specimens of bone-work with natural teeth which had been made in Paris as recently as 1872, and which had been sent for exhibition by Mr. Hepburn.

The meeting then terminated.

# ORDINARY MONTHLY MEETING,

*April 1st*, 1878.

ALFRED COLEMAN, Esq., President, in the Chair.

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The Minutes of the previous Meeting were read and confirmed.

The following gentleman was balloted for and duly elected a non-resident member :—

Edward Thomas Payne, 2, Sussex-place, Southampton, Non-resident.

The President announced that the Council, in consideration of the fact that new materials for filling teeth were constantly being brought under the notice of the profession, and that these greatly varied in value, had appointed a Committee, whose duty it would be to have analyzed and otherwise investigated the properties of such compounds, and a sum of money would be placed at its disposal to enable it to carry out any experiments that might be necessary. The following gentlemen had been selected for the work : Messrs. Chas. Tomes, Hutchinson, Woodhouse, jun., and Gaddes. They would first examine the fillings which had recently been brought forward by Messrs. Slayton and Poulson, and would be very glad to receive communications from gentlemen who had any special knowledge of the composition of these substances or of the best modes of working with them.

Mr. Ashley Barrett then read a communication on "Periodontitis, resulting from Devitalization of the Pulp by Arsenic." In a paper recently read before the Society he had

remarked that periodontitis might result from, and did sometimes follow, the use of arsenic. Two such cases had lately come under his notice, and as they presented some points of interest, he would briefly describe them. In the first case he opened the pulp-cavity of a lower left second molar with the dental engine. Arsenic was applied and kept *in situ* by a temporary osteo filling. In a few days the patient returned, having suffered severely in the interval. The tooth was very tender, and there was an ulcerated patch on the margin of the gum on the opposite side of the tooth to the cavity. The tenderness and ulceration increased, and in a few days the tooth had to be removed. After extraction the cause of the trouble was clear ; the drill had, after entering the pulp-cavity, penetrated the wall on the opposite side at a point where it was frequently very thin, viz., at the lower part of the pulp-cavity, near the junction of the two fangs. Through this opening, which was very minute, the action of the arsenic had extended, and had produced very severe periodontitis. He quoted the case because it illustrated his previous paper, although he feared that his reputation as a skilful operator would not be improved by the occurrence of such an accident.

In the second case he opened the pulp-cavity of an upper first molar in a girl aged 15. The application of arsenic was followed by great tenderness in the neighbourhood of the tooth. Three days afterwards he removed the stopping and thoroughly syringed out the cavity ; but the pain continued to increase, and after a few days he was obliged to extract the tooth. On splitting the tooth open he found the pulp very congested, and apparently recently deprived of its vitality. It had not the least odour of decomposition. The openings at the ends of the fangs were of course patent, but not very large. His opinion was, that the destructive inflammation caused by the arsenic did not cease at the ends of the fangs, but extended beyond and set up severe periodontitis. Such cases were rare, but they did now and then occur. Not unfrequently a tooth became somewhat tender after the application of arsenic, but he had generally found that the tenderness subsided in a few days.

He had observed that this extradental action of arsenic was not always confined to very young teeth, in which, on account of the large openings at the fang ends, one would be prepared to expect it. He should be glad if any light could be thrown upon these cases. Was there any means of judging before using the arsenic whether there was any probability of periodontitis resulting from its action?

Dr. FIELD then exhibited a set of instruments for use in cases of Rigg's disease. The prominent feature of this disease was the formation of a hard green tartar round the margin of the teeth, which gradually extended into the socket down to the roots. Inflammation was set up in the alveoli, and a purulent discharge was established, the teeth became loosened, and at last dropped out. The treatment consisted in the complete removal of the tartar from the tooth and alveolus. The gums were then well syringed, and aromatic sulphuric acid, either strong or dilute, was freely applied, and finally a weak solution of carbolic acid and iodine. He had previously used Howe's scalers, but found Rigg's instruments much more convenient and efficient. The treatment was of course somewhat severe; it caused a good deal of bleeding and pain at the time, and some soreness afterwards; but the result was very satisfactory. In a case he had lately been treating fourteen teeth had been doomed by six practitioners, but all were saved except three. It was very important that every vestige of tartar should be removed, and also that the local application should be applied as far as the disease extended, to the apex of the roots if necessary. For this purpose he used a thin stick of orange wood, cut to a point. In bad cases when suppuration had become established, it was necessary to cut away the inflamed and diseased margin of the alveolus. As a rule, three sittings, at intervals of a week or ten days, were sufficient to effect a cure.

Mr. CHARLES TOMES, in answer to a question from the President, said that the pathology of the disease seemed to him too important to be disposed of in a few minutes, as a casual com-

munication. It was, in the first place, an open question whether the tartar was not a symptom of the disease, instead of being the cause of it. He believed that the Council had under consideration a plan of proposing set subjects for discussion, and he would suggest that this should be one of them. He would therefore content himself with confirming Dr. Field's opinion of the treatment by means of these instruments. In the few cases he had treated with them he had met with an unexpected amount of success.

Dr. Field then exhibited an improved form of annealing lamp.

Mr. Charles Tomes then showed a specimen presented to the Society by Mr. Richardson, of Derby. It was an upper molar, the roots of which were coated with a thin layer of bone with a rough surface. The tooth appeared loose before extraction, and came out very easily. The inner wall of the alveoli, *i.e.* that which is in immediate relation with the root, was formed by a thin layer of dense bone, then came a layer of loose spongy cancellous tissue, and then dense bone again which forms the exterior of the jaw: in this case this inner shell of bone had come away with the tooth as a sort of sequestrum, though it had not the ordinary appearance of dead bone.

The President suggested that it might be a case of ossified periosteum.

Mr. Tomes said that he had not yet made a microscopical examination, but he thought the explanation he had just given accorded best with the naked eye appearances.

Mr. Charles James Fox exhibited for Mr. Phillips, of Liverpool, a model of the mouth of a patient, aged 26, a native of Venezuela, 5 feet 2 inches in height. The upper model, which was no larger than that of a baby's, showed four incisors

of the supernumerary type; there were no canines or biscuspids, and only one imperfectly developed permanent molar on each side. The lower model had unfortunately been lost, but the patient had no teeth in this jaw except two molars. As might be supposed, the patient had a very peculiar expression of countenance. He had no nails on his fingers, and those on his toes were very rudimentary. His parents were both strong and healthy people, and the only cause which could be assigned for the malformation was that his mother had while carrying him a severe attack of yellow fever.

The PRESIDENT remarked that he wished Mr. Phillips had mentioned whether the patient had the normal quantity of hair; in many cases where the teeth were congenitally deficient there was a redundancy of hair about the body.

Mr. C. J. FOX also showed for Mr. Browne-Mason, of Exeter, a geminated molar and wisdom tooth.

Mr. COLEMAN then vacated the chair, which was taken by Mr. Woodhouse, and proceeded to open a discussion on the "Treatment of certain Forms of Dental Irregularity."

*On certain Points in the Treatment of Dental irregularity: Extraction vice Expansion of the Dental Arch.* By Alfred Coleman, F.R.C.S.

Gentlemen,

A former president of this Society, and one whose opinions in practical matters I hold in great respect, my friend Mr. Barrett, has suggested to me, that in the absence of a paper containing original matter we might with profit discuss certain subjects in respect to which differences of opinion amongst us are known to exist. A sister Society has, as you are aware, devoted, occasionally, an evening to a discussion upon the nature of certain diseases—Cancer, Syphilis, &c. —and so successful and important have been the results of their discussions that I am emboldened to adopt, with the concurrence of the Council, the suggestion of Mr. Barrett, and attempt, in a small way, that which has been, on a much grander scale, achieved by the Pathological Society.

I have selected the above subject because my experience convinces me that a very great difference of opinion exists in regard to it. I am not, however, so sanguine as to believe that in discus-

sing it we shall arrive at conclusions which may determine our future practice, yet I venture to hope we may so far agree in generalities that our younger members at least may, as in the case of a sister profession, have in future "a case to go upon."

In regard to the question before us, I think it must now be acknowledged a settled point that the maxillæ, or at least their alveolar portions, in existing civilized communities are of a diminished size as compared with the uncivilized in present and past generations, whilst the contained teeth, if they have decreased in size, have not done so in the same proportion. The fact is evident, the explanation less so; although the views of Darwin and Wallace, that it has resulted from a smaller exercise of the jaws in civilized than in uncivilized communities, coupled with the tendency to perpetuate and increase the same by a sexual selection or breeding in, is the most satisfactory that has as yet been offered. Be this as it may, the consequence is that the dental surgeon of the present day is frequently called upon to bring into harmonious relation the teeth and maxillæ. For accomplishing this end two methods of procedure present themselves,—one, which is commonly termed expansion of the jaws; in reality but a small expansion of the alveolar arches, though often a considerable expansion

of the dental arches, by which means room is afforded for teeth which, owing to absence of space, have assumed prominent or otherwise irregular positions,—in plain words, making the jaws to harmonize with the teeth. The other method consists in simply lessening the number of teeth, or, in plain words, in making the teeth to harmonize with the jaws.

The first of these methods commends itself to our attention as being natural and conservative, and in its execution there is no great difficulty. Plates of vulcanite rubber, with compressed pegs of wood acting upon the lingual aspects of the bicuspides and molares, are adapted to the palatal surface of the mouth, and as the superior dental arch is thus laterally expanded, the inferior, from the interlocking of the teeth, follows, but more slowly. By such lateral expansion room is generally afforded to reduce prominent incisors or canines from irregular to even positions. In describing this process of expansion I have much pleasure in alluding to the ingenious appliance, first, I believe, suggested by Dr. Coffin, of this city, which consists of a vulcanite plate, such as I have described, but capping the teeth of necessity in the majority of cases, unless held in by clasps, wires, or ligatures, divided in the median line of the palate into two halves, which are held together by a piece of pianoforte wire bent

thus (Fig. 1), and which, acting as a spring, opens the plate, and thus gradually enlarges the dental

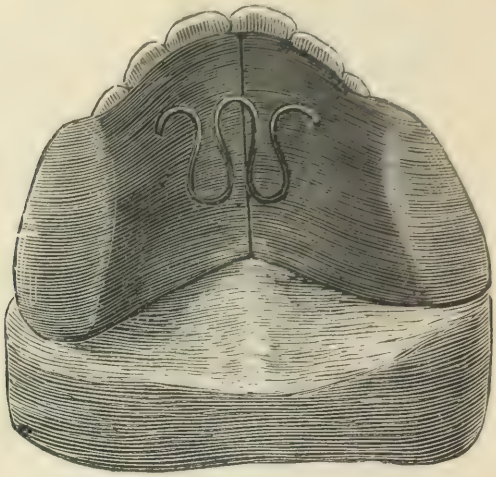

Fig. 1.

arch. The advantages of such an arrangement are obvious; steadiness and uniformity of action, together with the avoidance of numerous visits so necessary in such cases, yet so much complained of by parents and guardians of youths at the ages such treatment is demanded. To Dr. Kingsley of New York, I am informed, must be accorded the credit for having suggested the connection of a small piece of zinc in contact with the steel wire, which prevents the rusting of the latter and its breaking after a few weeks.

Now without denying that this principle of extension is admirably suited for many cases—and I largely employ it myself in those where the bicuspides and the molares of one side are abnor-

mally approximated to the opposite side (Fig. 2), often so much so, that the teeth of the upper jaw

Fig. 2.

bite within those of the lower jaw; yet in many, and indeed the majority, of cases arising from the conditions before stated, I adopt the second plan, viz., that of adapting the teeth to the maxillæ; and from considerations best explained by adducing cases in practice.

In order that we might ascertain with some accuracy the merits of the two plans of treatment, it would, I am aware, be necessary to take a certain number of cases, and treat each first by the expansion method, and afterwards by a removal of certain teeth, followed by mechanical contraction of dental arches; but even such a desirable end as could be thus obtained would never justify the means. I can, however, adduce a case in which this was done, and which, amongst

other subjects as well as this present question, I brought before the notice of the Society just thirteen years ago. The case in question was a female patient, aged thirteen years and a half, in whom, owing to the conditions dwelt upon, the eye-teeth were unduly prominent, whilst the upper lateral incisors had descended within the dental arch, and were bitten over by the cuspidate of the lower jaw (Fig. 3). At the time the case was treated, viz. some twenty years ago, much was

Fig. 3.

said and written in favour of expansion of the dental arch *vice* extraction, and acting upon arguments which then appeared to me as sound and rational, I carried out this object, not without difficulty, as our means and appliances at that time were not as efficient for the end as they are

now (Fig. 4). Considerable improvement followed; the dental arches became, the upper

Fig. 4.

regular, the lower much more so; whilst, owing to the bite being rendered natural, the lengthening of the face and underhung expression had quite disappeared. But yet perfection was not attained, the mouth appeared out of proportion with the rest of the features, unduly prominent, and causing a somewhat plebeian expression; moreover, after three or four years, although a plate had been perseveringly worn at night, there was a slight tendency to return to the former condition, as the upper laterals, being somewhat short, were not kept in position by the bite. Under these circumstances I was not sorry to find the two first lower molars carious, and to remove them; and then by the sacrifice of

two bicuspides, the superior dental arch was reduced; indeed, without mechanical appliance the teeth soon fell into admirable position, and the mouth assumed a form in perfect harmony with the other features—a condition which exists, I can verify, up to the present time. My feeling that the above is a really instructive case must be my apology for bringing it before the Society a second time.

The next case I bring under your notice is that of a little girl, now aged 14 years, who came to me at the latter end of 1875, in regard to the prominence of her front teeth. From her position and circumstances, I recommended a second opinion, which the parents were the more willing to take as I proposed a sacrifice of two sound teeth in the upper jaw, the lower jaw being small, and its front teeth biting far within the upper arch. The opinion was not a confirmation of mine, expansion of the arch being recommended. I still adhered to my conclusions, explaining that, as the child had very small features I was convinced expansion would yield a feature out of proportion to the rest.

The photograph I hand round shows the case before treatment; the prominent central incisors resting on the lower lip, a soft elastic cushion, so fatal to the increase and perpetuation of this deformity.

This photograph, like most others, fails by exhibiting the features as larger than in reality; and I regret that the parents who kindly lent me this have not had another done of the patient since, as I think you would feel convinced I had not erred in adhering to my decision in regard to the mode of treatment I pursued. This was removing the two upper first bicuspides and inserting a plate carrying an elastic band in front of the incisors and canines (Figs. 5 & 6). Mechanical treatment must, I think, be as a rule pursued

Fig. 5.*

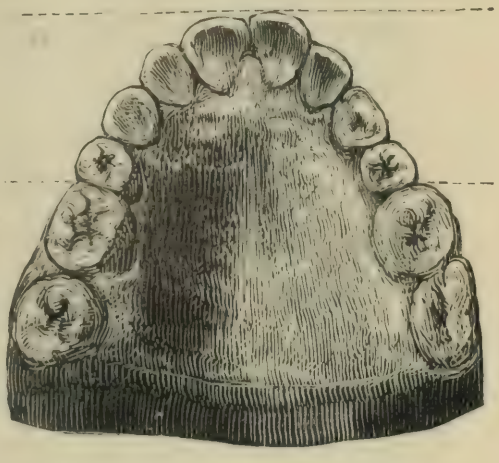

Fig. 6.

when the incisors rest upon the lower lip; otherwise, the mere pressure of the lips when they close over the teeth, will generally be sufficient to reduce the undue prominence. The value of being able to treat any case of dental irregularity with-

* The dotted lines are introduced to show the distance the incisors have been brought inwards by the treatment pursued.

out mechanical appliance is very great, for although by the strictest care and cleanliness much may be done to prevent injury to the teeth, I daily became more conscious of the evils attendant upon the long-continued use of regulation-plates, especially of such as have to cap the teeth.

Another case of a very similar character to the last, and which I then proposed to treat in the same manner, has at my suggestion been advised to obtain a second opinion, the result of which I am now waiting.

These, gentlemen, are my general views upon the subject, general because so many exceptional conditions present themselves in these cases, that I might, and for very good reasons, depart from them to-morrow. I can only regret that the members of the Society did not receive a notice of this discussion, as we might thereby have had the presence of some who could have shown strong grounds for antagonism to the position I have taken up. The fault however was entirely my own, my pocket containing up to yesterday the notice I believed I had posted to our worthy Secretary, of the object of our present meeting.

## Discussion.

The Chairman said he had been much interested by the paper which Mr. Coleman had just read, and he hoped that, considering the importance of the subject, a good discussion would follow. He thought, however, that only general principles could be settled beforehand: it was impossible to formulate any set rules which would meet all the numerous factors which had to be taken into consideration before commencing the treatment of one of these cases. There might sometimes be a difference of opinion as to the best mode of treating a given case, and each must be considered on its own merits. The age of the patient, for example, was a most important factor. At the proper age the removal of a tooth or two was all that was necessary; the other teeth generally fell into their proper position of their own accord. But even this must not be taken for granted, for he had occasionally been obliged to use mechanical means in order to get the canine into line after the removal of the bicuspid.

Dr. Field said he was very anxious to hear the subject fully discussed, and would therefore do his best to set the ball rolling. He would commence by stating that he scarcely ever found it necessary to extract a tooth in order to correct irregularity. In judging of the success of one's own practice, it was necessary to remember that we don't always see our failures; but allowing for this source of fallacy, he had met with a sufficient amount of undoubted success to encourage him to keep to the line of treatment he had indicated. As Mr. Woodhouse had remarked, a number of points had to be thought over in each case; not only, for example, the general contour of the face, but also the action of the muscles must be considered. He had then under his care a young lady, aged 17, whose

facial muscles were constantly in a state of contraction. She was always puckering her mouth, &c., and he feared that this troublesome habit or infirmity would greatly interfere with the success of his efforts to expand the maxilla.

A good deal had been said about the tendency of cases treated by expansion to relapse when the plate was discontinued, but he had met with but little difficulty from this cause. The fact was that in many cases the patient did not wear the retaining plate long enough : it should be worn night and day for a considerable time. The case might be under treatment for six months, a year, or even two years ; but with care and patience success, save under very exceptional circumstances, was certain. Nor had he seen much injury done to the teeth by this treatment ; but it was most important that both the plate and the teeth should be kept scrupulously clean : he always impressed this strongly on the patient, and generally ordered them to use a wash of dilute carbolic acid. As to the means he used, he had nothing original to bring forward. For front teeth he used the inclined plane with hickory pegs, spring, or jack-screw. This last he never used except for a single tooth, because it had to be adjusted by the operator, and the patient could not remove it, for the purpose of cleaning, and replace it himself. For expanding the arch he used the plan spoken of by Mr. Coleman, that invented by Dr. Coffin. It was important to ascertain in each case the proper position for the spring, so as to get the pressure on the proper teeth. He had known it to cause separation of the median suture in very young children, proving that the spring had some power.

Mr. Catlin thought it was quite impossible to lay down any general rule for the treatment of dental irregularities, since no two cases were ever exactly alike ; but he felt bound to state that when the irregularity could be remedied by extraction he preferred to avail himself of this method. In the first place treatment by expansion was only possible in the case of young patients. After the age of 19 or 20 it was useless to attempt it. Then the treatment was very tedious ; it must be persevered in

for months, or years, else the teeth would return more or less to their former positions. And lastly, he had undoubtedly seen great injury done to the teeth by the mechanical treatment. He had now under observation a patient, aged 34, in whom two upper molars had been loose ever since the wearing of a regulating plate, at the age of 10 or 12.

Mr. Sewill was also of opinion that harm was often done by mechanical treatment. It was tedious and painful, and he had seen teeth loosened by it. The difficulty was to get a fulcrum, and to apply the force so as not to do injury to the teeth. Then it was impossible to gauge accurately the amount of force which was being applied. He thought that some of the ill effects were due to the occasional use of too great an amount of pressure. The surprising effect which might be produced by a comparatively small amount of force continuously applied was well exemplified by the deformities which resulted from burns, and also by the successful treatment of knock-knee in children by the simple plan of putting a pillow between the legs, and tying the feet together. He thought that in cases where the teeth were sound gradual expansion might sometimes be used with advantage; but in the case of delicate teeth he preferred to make plenty of room by extraction.

Mr. Canton said that generally speaking he was in favour of extraction. In many cases the patients could not or would not give the time and attention which was absolutely necessary for successful treatment by expansion of the arch. Then the ultimate result of the treatment was always more or less doubtful, and there was the risk that the plate might do more harm than the expansion would do good.

Mr. Ashley Barrett said that if the alveolar arch could really be expanded, that would be a strong argument in favour of expansion, but he was not aware of any means of accomplishing this with certainty. In most cases the crowns of the teeth were pushed out, while the position of the fangs was

but little altered. For this and other reasons he preferred extraction.

Mr. Moon said he was in the habit of using the expansion method in suitable cases. He had then a case under treatment in which he had applied Dr. Coffin's plates; but he used the jack-screw instead of the spring.

Mr. Vanderpant thought that in children, at all events, irregularities might be remedied without the employment of any very serious or complicated measures. The habit of thumb-sucking was one very common cause of irregularity, and should always be inquired about.

The Chairman remarked that thumb-sucking was undoubtedly a common cause of displacement of the front teeth. He was in the habit of directing that the child should sit when reading, with its elbow on the table, and resting the upper lip on the closed hand: the deformity was easily cured by this means.

Mr. Charles Tomes said there was one point which had not yet been referred to during the discussion, but which appeared to him an additional argument against universal treatment by expansion. It was this: when an irregular set of teeth had been successfully expanded and brought into line, their tendency was to return to their former positions. If they did not return, what was it which prevented them? They were retained by mutual pressure, were, in fact, keyed out like the stones of an arch. But this close contact was not good. The teeth had a certain amount of motion in their sockets, and under ordinary circumstances, when a molar tooth had been extracted, facets would be found on each side, caused by friction against its neighbours. Under the circumstances just stated the force of this friction was much increased, and the wear proportionately greater. His opinion was that expansion was only suitable for cases where the amount of irregularity was slight, or when the mouth was exceptionably healthy.

The CHAIRMAN said he thought that the teeth were kept in position after expansion chiefly by their articulation with the opposite teeth, and that this was a great point to be attended to for the prevention of relapses. If the articulation was not very marked, it should be improved by the use of the Morrison engine.

Dr. FIELD said that so far as the discussion had yet gone he thought he was more called upon to make a reply than was the author of the paper, and he therefore asked the President's permission to supplement his previous observations. He did not object to the treatment by extraction when this was really necessary, but he did strongly object to the extraction of teeth, simply because it was easy. He looked upon it as wanton destruction of the dental organs. Much was said about the trouble and expense to the patient. As to the trouble, patients would readily submit to this in preference to the loss of sound teeth, if they were assured of the ultimate success of the treatment, and in the matter of expense he thought the dentist should rather forego a portion of his ordinary fees than do that which was not strictly the best for his patient. As to injury to the teeth, that could be obviated by proper care on the part of the patient, and there was no difficulty in making patients pay attention to these details if their importance was clearly and forcibly explained to them. He always took care not to have the teeth "keyed out," as Mr. Tomes had expressed it, but so placed as to allow floss silk to be easily passed down between them. The point to which the President had called attention was also important, viz., that *both* sets must be got into proper articulation. No hard and fast rule of treatment either by extraction or by expansion could be laid down, but he thought that in the great majority of cases success could be obtained without extraction, and he wished most emphatically to condemn the practice of extracting merely to save trouble. We profess to be striving to elevate the standard of the specialty of dentistry, and to place it on its legitimate level, side by side with the other specialties of medicine and sur-

gery; but I fail to see that we take the steps most likely to aid in the accomplishment of this good work, when we, for such trivial excuses as "want of time," and the easier method, and for such sordid motives as "insufficient pecuniary compensation," sacrifice the very organs which we should strive by every possible means to conserve.

Mr. MERSON said that, having been house-surgeon at the hospital for nearly two years, he had had excellent opportunities of seeing the results of treatment by both methods. He had tried expansion, and with a certain amount of success, and had found the jack-screw of great value; but in many cases it was necessary to consider not what was the best, but what was possible, and as the great majority of the hospital patients were quite unable to afford the time necessary for the proper carrying out of the treatment by expansion, he had generally been obliged to recommend extraction.

Mr. HUTCHINSON remarked that in connection with the plan of treatment by extraction, a very important question might be raised. Was it possible that, as practitioners now removed many teeth in jaws ill developed, in future generations would the loss or absence of teeth be transmitted hereditarily? In other words, does the extraction of teeth in parents lead to absence of similar teeth or contracted jaws in the offspring born afterwards? This point he would commend to the attention of those present, who would have many opportunities of taking accurate notes on the subject. For his own part, he did not think that extraction of teeth would have this effect any more than would the amputation of a leg or a finger in one or both parents lead to a deficiency or defect in the offspring. As to the question of expansion, he held that the most suitable cases were those of the so-called V-shaped upper maxilla, provided always the lower maxilla formed a normal arch, so that when the upper teeth were moved outwards they would properly inter-digitate with the lower ones. Where extraction would answer, he always preferred it.

Mr. GADDES said it was implied by Dr. Field, and alluded to by Mr. Hutchinson, that the extraction of teeth in childhood might in time lead to the suppression of those teeth in the offspring. If he rightly apprehended the principles of "origin of species" and of evolution, they gave no credence to the supposition so expressed. With reference to expansion of the dental arch, he thought they ought to determine whether it was not more desirable to expand the whole maxillary arch, rather than force the teeth outwards simply.

The CHAIRMAN said that it appeared to him most important not to remove teeth at too early an age. The 12-year-old molars should be well up before the bicuspids were removed, else the space hoped for would be quite lost.

He then called upon Mr. Coleman to reply.

Mr. COLEMAN said that his paper had been written with the view of eliciting a good discussion, and he was pleased to find that it had been successful in this respect. At the same time he hoped he had not unduly depreciated the value of the expansion treatment. Had he known how little would be said in its favour, he might almost have appeared as advocating "expansion *vice* extraction." As a fact, he had found the expansion treatment very useful, and had obtained excellent results from it. Nor had he experienced much difficulty in carrying out the process, though it was certainly somewhat tedious, and it required scrupulous care on the part of the patient as well as the dentist to prevent injury to the teeth. He should have stated that the "Coffin's plates" should be articulated to the lower teeth as well as the upper, when the lower as well as the upper jaw was imperfectly developed, and thus the relative positions of both sets would be maintained. What he had desired to call attention to was the fact that mere mechanical success was not everything; the harmony of the features must be studied. In patients with small jaws the other features were frequently small also, and the expansion of the jaws would altogether ruin the expression of the face. The age of the patient was certainly a most im-

portant point in relation to the treatment to be pursued. It was quite possible to extract too early. He had seen cases in which all bicuspids had been removed, and yet the front teeth remained crowded, because the extraction had been premature. He had no doubt that the removal of teeth continued for several generations would result in the production of a smaller jaw in time. The surprising way in which cattle-breeders modified different features, almost at will, by breeding in and in, showed how strong was the tendency to transmit peculiarities by inheritance.

The thanks of the Society having been voted to Messrs. Coleman, Barrett, Field, &c., for their communications, the meeting adjourned.

# ORDINARY MONTHLY MEETING,

*May 6th*, 1878.

ALFRED COLEMAN, Esq., President, in the Chair.

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On taking his seat the President said he had great pleasure in announcing that the highest distinction of the scientific world—the fellowship of the Royal Society—had recently been conferred on a member of their Society (Mr. C. S. Tomes). The prize had been thoroughly well earned; but as the coveted distinction did not always happen to fall in the right direction, he heartily congratulated the gentleman referred to on having obtained it, and thanked him for the honour which had been conferred, through him, on the Odontological Society.

The Minutes of the previous Meeting were then read and confirmed.

The following candidates were nominated for the Membership of this Society:—

J. C. Foran, Marshfield House, Eastbourne, Sussex, Non-resident.

George Hockley, 45, Great Marlborough-street, W., Resident.

William West, 9, Ackerman-road, Brixton, Resident.

Josiah W. Worster, 27, Newington-crescent, Kennington Park-road, Resident.

Mr. Charles Tomes exhibited a model showing misplaced or supernumerary canine; also a lobulated fibroid tumour attached to the fang of a molar tooth, which had been sent to him by Mr. Morris, of Chester; and an antique extracting instru-

ment, which had been presented to the Museum by Mr. E. B. West.

Mr. RANGER said he had met with a tumour similar to that just exhibited, but growing from a wisdom tooth. The tumour had been growing about eight months when the patient came to him; the tooth was turned over on its side, and completely hidden by the growth. It had not given rise to any pain, but had been a source of annoyance on account of the occurrence of hæmorrhage from it at inconvenient times.

Mr. CHARLES TOMES showed a modification of Kirby's Pneumatic Mallet, which had been made for him by Mr. Frost, of Poland-street. He had always thought that the principle of Kirby's Mallet was good, and that its failure in practice had been due to the fact that sufficient attention had not been given to its manufacture. In his instrument the force of the blow was regulated by allowing a portion of the air which acted on the piston to escape from the cylinder through a series of small holes. Some or all of these could be opened or closed at will by means of a sliding tube fitted outside the cylinder: it was very important for the proper working of the instrument that this outer tube should be made to fit accurately.

Mr. HUTCHINSON said he had obtained one of Kirby's mallets from the depôt, but had been obliged to discard it, owing to the fact that it was badly put together, and consequently very uncertain in its action. He was very pleased to testify that, so far as he had seen, Mr. Tomes's instrument worked with the greatest ease and readiness, and seemed to be thoroughly reliable.

The PRESIDENT then called upon Mr. G. H. Harding to read his paper on "The Process of Absorption in Bone and Tooth Structure."

## *On the Process of Absorption in Bone and Tooth Structure.*

By Geo. Hilditch Harding, L.D.S.

Mr. President and Gentlemen,

The reason I have selected the subject of Absorption for my paper this evening is, that I am not aware that it has previously been brought before the notice of this Society in the form of a paper. I think that the process of absorption is a very interesting one, and especially so to us as Dental Surgeons, considering what an important part it plays in the various physiological and pathological changes which take place in the dental region, and that it opens up a field for vast future investigations.

The authors who have written upon it are not very numerous, neither do their views entirely coincide as to the manner in which the marvellous changes are effected. Bilroth says: "The cause of the atrophy of bone along the walls of the Haversian canals, which takes place in most new formations in the bone, is difficult to explain. The appearances of the connective tissue and muscular substance, as well as of other soft structures when inflammatory new formations occur in them, are less strange; but that hard bony

substances should be thus absorbed is truly remarkable."

Now, what is absorption in the hard tissues? I would define it as—

That process by which formed material is reclaimed or retaken up into the system by means of the absorbent cells, known by the name of "*osteo-clasts*."

The process may be perfectly healthy and normal, or it may be entirely pathological, resulting from certain peculiar inflammatory conditions.

In illustration of its physiological action I would point out the important part it plays in the development of bone. The alteration in size and in shape of the various adult bones, as compared with those of the fœtus, is accomplished through the influence of absorption and deposition. The lower jaw is a good example of this: in the fœtus the angle is very obtuse, whereas in the adult it assumes almost a right angle, and in old age we again see it assuming the obtuse angle, this great change in shape being effected by the combination of those two forces.

Now, with regard to the increase in size of the adult bone compared with the fœtal bone, this change is brought about in a similar manner; the external contour is increased by deposition taking place beneath the periosteum, and also beneath the articular cartilages, whilst at the same time

absorption is taking place in the interior of the bone; the internal layers are gradually being changed from the compact tissue into the cancellous, and so the medullary canal is increased in calibre, and as deposition is more active during the period of development than that of absorption, the walls of the medullary canals are increased in thickness.

Proceeding with this subject from its physiological aspect, I will examine briefly the great changes which take place in the dental alveoli.

During the formation of the teeth we find the formative process very active, and the bone is being built up around them until they are enclosed in bony cells or crypts; and if we examine them again at a later period, we find that the process of absorption has set in, by which the walls of these crypts are removed to allow of the eruption of the contained teeth.

The crypts which contain the incisors have their anterior walls removed, so as to expose the labial surfaces of the crowns of those teeth; whereas in the crypts of the molars that portion of the wall covering the points of the cusps is the first to be removed. After the teeth have erupted, the formative process again sets in, and the bone is built up around the erupting teeth, so that when they are fully erupted their fangs are encased in bony sockets. The deciduous set, together with their alveoli, are removed by the

advent of this absorbent process. In the incisors we find absorption as a rule taking place on the posterior surfaces of their fangs, and commencing near their apices; and in the molars absorption takes place in the upper jaw on the internal surfaces of the palatine and buccal fangs, which approximate the erupting bicuspids, and in the lower jaw the anterior surface of the posterior fang, and the posterior surface of the anterior fang, is the first to be removed. I will refer to this subject further on in my paper. In old age again, when these useful organs are too apt to throw off their mortal coils, or become the victims of the forceps or the elevator, their former habitations are removed by the absorbent process, so that in the edentulous jaw there eventually remains little but the dense compact tissue of the body of the bone. Having glanced, very superficially, at the prominent part this process plays in a few of the physiological changes which occur in the hard tissues, it will be well to consider its connection with certain pathological conditions and actions; but before doing so, I will describe the histological appearances presented, and some of the various theories advanced as to the method by which the lime salts are removed.

If an absorbed surface be examined by a moderately powerful magnifying-glass, it will present a rough, uneven, jagged, or, as one author aptly describes it, "a gnawed appearance," and

the surface will be covered with pits or excavations. If a section be cut through an absorbed surface at right angles to it, the edge of the section which has been acted upon will present certain peculiarities. It will appear to be made up of a series of arcs of circles, as though round pieces had been punched out of the edge; the spaces between these indentations being occupied by the sharp projections formed by the edges of the adjoining circular excavations.

I believe that Howship was the first to notice and investigate the nature of these excavations, and consequently they have received the now familiar name of *Howship's Lacunæ*. There is, in contact with a surface where absorption is taking place, a new formation which is richly supplied with cells; this is the absorbing organ. The cells are of the compound order.

In connection with the absorption of the temporary teeth, the new formation which is there present, and is identical with that found elsewhere in many respects, has been called by Tomes the "Absorbent Papilla," and it would be difficult to give a better description of it than the one given by that author; he says: "The surface is made up of peculiar multiform cells, each one being composed of several smaller cells, the number varying from two or three to as many as fourteen or fifteen. The form is variable, but egg-shaped or spherical figures are found to prevail, although

some few deviate from these forms and offer a very strong resemblance to those cells described by Kölliker as myeloid cells." If a section be made carefully from a fresh specimen, with the aid of some decalcifying agent, it will be seen these pits or excavations are occupied by cells. Sometimes it will be seen that one excavation will contain one cell, at others two or three.*

Völkmann describes certain changes, to which he has applied the name of *canaliculization*, and which takes place in the bony tissue previous to the advent of the absorbent process. He says that in examining sections at this period he has observed numerous canals ramifying through the tissue, which canals make numerous communications forming a very complete anastomosis. The outlines of these canals present numerous projections, which very much resemble the margins of bone lacunæ; and as these canals run in the same direction as the bone lacunæ, and occupy the position of former lacunæ which have been destroyed, he considers that they are due to the increased flow of blood in the part, consequent upon inflammatory conditions existing; and that the canaliculi of the bone cells by which the circulation in the bone is ordinarily maintained, become enlarged in order to meet the

* Rustizky found that if he applied vermilion to the living tissue where these cells were present, the cells took up the granules into their substance.

increased flow of blood which takes place. Völkmann thought that these canals were occupied by capillary vessels. Rindfleisch has also observed this canaliculization, but does not support this latter view. He says:—

"I have never succeeded in injecting them from the blood-vessels, or in finding the characteristic elements of a capillary tube, such as a nucleated membrane, in their interior. Judging from the way they refract light, the contents of the canals must be identical with that of the bone lacunæ; hence I can only regard them as a further development of the nutrient apparatus provided by the system of anastomosing lacunæ."

Bilroth says: "At present it is not known how the lime salts are dissolved in this process; I think the new formation in the bone develops lactic acid, which changes the carbonate and phosphate of lime into soluble lactate of lime, and which is taken up and removed by the vessels."

Rindfleisch is of opinion that a solution of the intercellular substance takes place in the fluid. It has been a source of some controversy as to the manner in which *Howship's Lacunæ* are formed. Virchow and others were of opinion that each of these excavations corresponded to the nutrient territory of a bone-corpuscle. Bilroth says he is convinced that the bone-corpuscles have as little to do with this process as the fixed connective-tissue cells. I think that the fact of

our finding these *Howship's Lacunæ* in dental tissues which possess no bone-corpuscles (viz. Dentine and Enamel), would tend to disprove this statement altogether.

Passing on from its physiological characteristics we may consider this process from its pathological aspect.

Take first of all a case of *osteoplastic ostitis*, as an example of which I will consider a case of fracture, seeing that the inflammation set up is of that character. As a result of the injury, the tissues in the immediate neighbourhood become inflamed, a cellular exudation takes place in the medulla, on the surface of the bone and in the Haversian canals, and capillary loops form. The cells appear to collect upon the walls of the Haversian canals, and the flow of blood is greatly increased. The Haversian canals become enlarged by the gradual absorption of their walls; the cell-proliferation goes on as absorption makes room for it, and so the neoplasia thus formed in the two pieces of bone eventually meets and unites the fractured surfaces. If a section be made of a bone at this stage, Howship's Lacunæ will be plainly visible. Now when the required amount of neoplasia has been thrown out, ossification sets in.

This new formation may be either transformed into cartilage or it may ossify directly, and the new bone be deposited on the absorbed surfaces

of the Haversian canals, making the canals of the two fractured surfaces continuous; at the same time the neoplasia in the medulla and beneath the periosteum on the surface of the bone is undergoing ossification, forming the external and internal callus. If a section be made at this stage, the line of absorption in the Haversian canals can be discerned with the new bone deposited upon its surface. After a fractured bone has united, great changes take place in its shape and structure. There is great difference in the amount of callus which is formed in the various bones.

In the flat bones there is not much callus thrown out, and in those of the skull there is scarcely any formed at all; but the surfaces appear to be glued together, and the union which takes place in them is chiefly effected by the callus, which is formed in the Haversian canals at the expense of their walls, in the manner previously described. The amount of callus formed in some of the long bones is very considerable. The structure of newly-formed callus is of a very porous nature; this eventually becomes consolidated, and the superfluous callus is removed by absorption.

In long bones, where union has taken place whilst much displacement of the fragments existed, the masses of callus thrown out are so enormous that one can hardly imagine such de-

velopment taking place, were there not specimens to illustrate it.

Now, what is still more remarkable is, that in some of these cases, notwithstanding the gigantic masses of callus and great displacement of the fragments which exist, absorption and deposition so work together, hand-in-hand, sometimes for years, that eventually the bone becomes remodelled, the superfluous callus being removed where required, so that the original shape is nearly restored, and a new medullary canal tunnelled out in the place of the one obliterated by the fracture.

There are cases on record, or one would be unable to realize that such marvellous changes could be effected.

Bilroth states that where a fracture takes place in a spongy bone the bony cells become filled with bony substance, but that this is eventually removed by absorption.

In "caries," which is in reality a chronic inflammation of the connective tissue of the bone, accompanied by a wasting of the compact osseous tissue of the bone, we again find the granulating tissue being developed and absorption taking place.

The individual trabeculæ of bone become absorbed, and so cut off and removed. If a small flake of bone be removed from a carious spot, and be examined under the microscope, *Howship's*

*Lacunæ* will be seen on its edge; and should a section also be made from the bone in the immediate neighbourhood of a carious spot, and the lime salts removed by chromic acid, it will appear to be eaten away, and the carious edges will present the characteristic excavations met with on an absorbed surface, and fitting closely into these irregularities will be seen the new granulation-tissue.

In *necrosis* the portion of dead bone is separated from the living by the assistance of this process. Inflammatory action takes place in the adjacent living bone, granulation-tissue is thrown out, which removes the lime salts from the line of demarcation, and from the walls of the Haversian canals, which latter become consequently enlarged.

After the necrosed portion is thrown off, ossification sets in, and the Haversian canals form fresh communications, and so the circulation is maintained again, which was of necessity previously interrupted.

On microscopical examination it will be seen that the dead portion of bone which has come away has undergone absorption, as well as the living surface from which it has been detached.

There is only one more morbid process in bone to which I will allude, and that is the peculiar disease known as *Mollities ossium*. Here we find the bone not diminished in size, nor altered in

shape, but exceedingly brittle and porous in structure: it is easily cut or bent.

Rindfleisch says:—

"If we break off a minute trabecula from the cancellous texture of a bone affected with this disease, and, after soaking it in carmine, examine it under a magnifying power of 300 diameters, we find a highly characteristic set of appearances. The trabecula is seen to consist of two very different substances; it exhibits two very distinct zones,—an outer one lying next the medullary spaces and the Haversian canals, and an inner one, which forms the axis of the trabeculæ.

"The inner zone consists of perfectly normal bone-tissue. The corpuscles with their countless anastomosing prolongations, the highly refracting colourless basis substance, are unaltered.

"The outer layer, on the other hand, exhibits a finely striated basis substance deeply stained with carmine, in which only a few scattered streaks of shadow indicate the former position of the bone-corpuscles, and of their processes not a vestige remains." The line of demarcation between these two zones is very decided, and exhibits the same semicircular excavations which are met with in other inflammatory processes which occur in bone-substance.

Green notices one or two rather interesting facts in connection with this disease. He states that the medullary tissue contains fat, that lactic

acid is found in the bone and also in the urine, and that lime salts are eliminated by the kidneys.

I should like to say more in connection with this subject in its relation to bone, but in order not to make my paper too lengthy I will pass on to the various dental tissues. It will be seen that here, as in bone, it may assume entirely a physiological action, or the process may be the result of inflammatory conditions. As an instance of the former, the shedding of the temporary teeth forms a good illustration.

Some hold the opinion that the deciduous tooth is removed by pressure exerted by the coming permanent tooth; but there is such abundant proof of the inaccuracy of this statement, that I do not think it can be accepted. One of the most convincing arguments against it is one advanced by Charles Tomes; it is this: that as the fang of the deciduous tooth becomes absorbed so the socket closes up behind it by the deposition of new bone; so that if the socket of a deciduous tooth, about to be shed, be examined, it will be found that a plate of bone exists between it and the coming permanent tooth, so that no pressure could, under those circumstances, be exerted.

Spence Bate, in a communication he once made to this Society, advanced the theory that in the removal of the deciduous set the enamel-organ of the permanent tooth performed the office of an absorbent organ; but this is again incorrect,

for at this period the enamel-organ of the permanent tooth has undergone calcification.

I think it has been pretty clearly recognized now, that for the removal of a deciduous tooth a proper absorbing organ is formed, called the *absorbent papilla*, the structure of which was described in the early part of this paper. This organ is accurately adapted to the absorbing surface, and on the removal of a temporary tooth we often find a portion of this organ torn away and adhering to the absorbed surface.

The appearances presented in the dental tissues are very similar to those seen in bone; but there are several differences which will require some consideration.

Of the three dental tissues, only one can be replaced after its removal by absorption, by a similar tissue,—viz. the cementum, or crusta petrosa. The enamel and dentine, when once removed by this process, can never be replaced by the same tissue, although they may be, and often are, replaced by cementum.

Microscopic examination clearly illustrates this result; a favourable specimen will sometimes show the *granular layer of Tomes* broken by the action of absorption, and the gap entirely filled by cementum; and the former line of absorption separating the two tissues with Howship's Lacunæ, plainly discernible, will be readily recognized. Under No. 1 microscope (Fig. 1), a

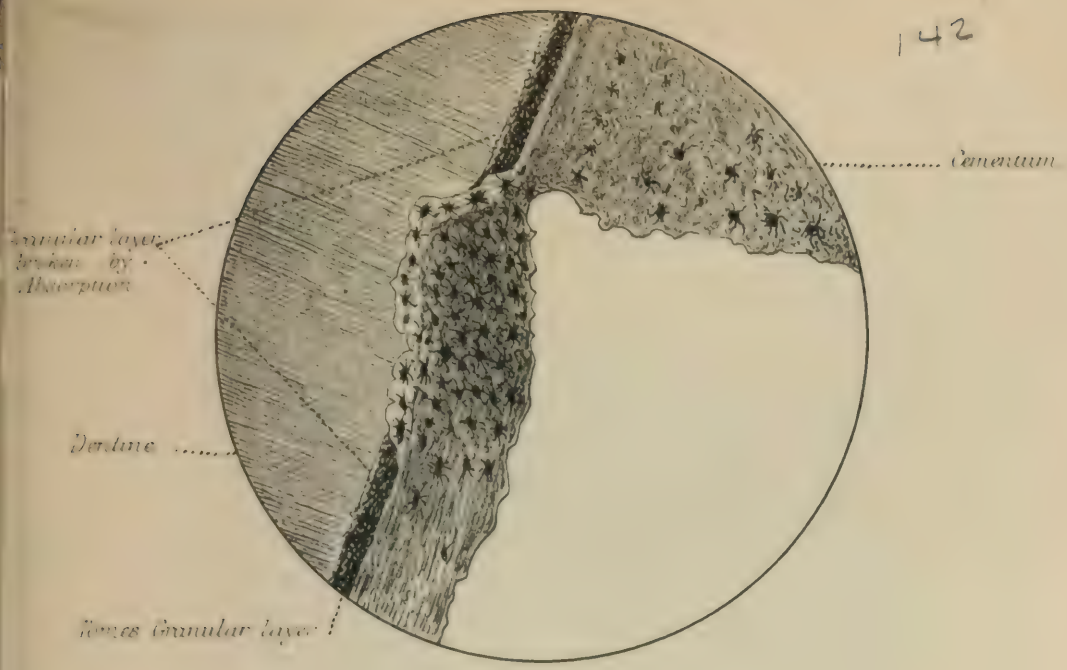

Cementum
Granular layer broken by Absorption
Dentine
Fewer Granular layer

Fig. 2.

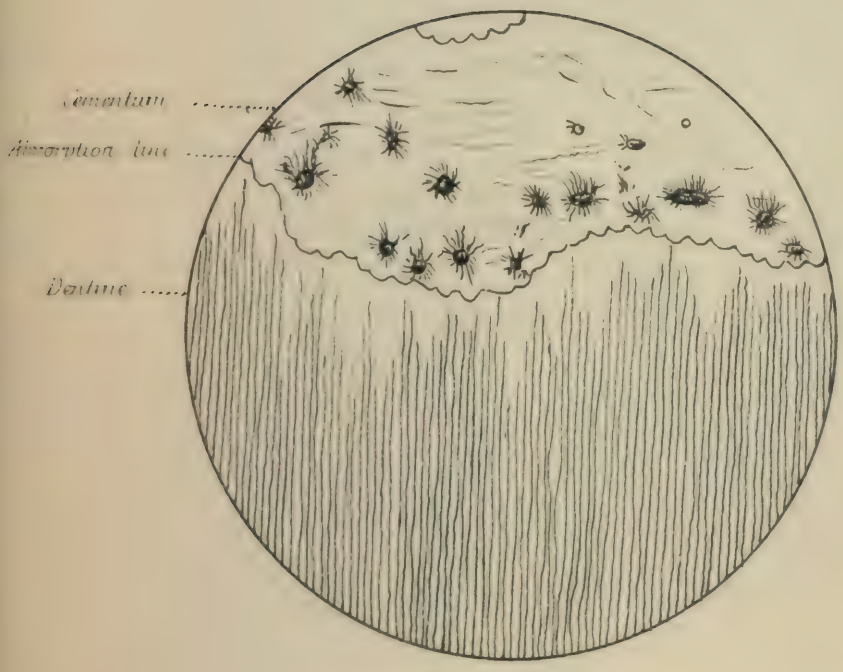

Cementum
Absorption line
Dentine

Fig. 1.

142 2

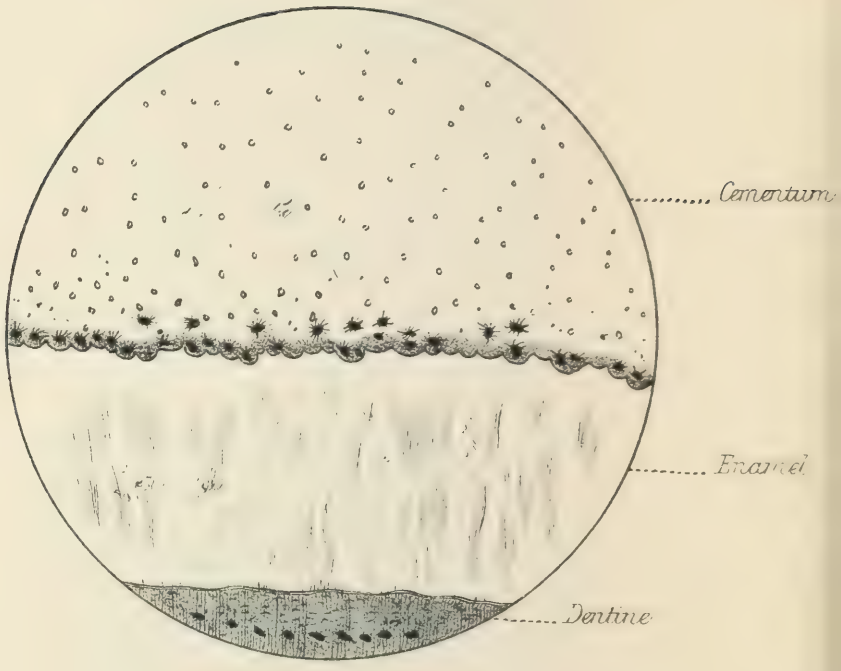



Fig. 3.

specimen for which I am indebted to Mr. Robert Brookhouse, of Manchester, is a longitudinal section of the fang of a human molar tooth, and well shows this appearance; also under No. 2 microscope (Fig. 2), for which I am indebted to Mr. W. G. Ranger, is a transverse section of the fang of the molar tooth of a rhinoceros, and in this specimen (which is very well marked indeed) the interruption of Tomes's granular layer can be traced. In some instances the enamel will be found to have been removed, and cementum-tissue deposited.

Under No. 3 microscope (Fig. 3) is a transverse section of a horse's tooth. On examination it will be seen that the edge of enamel which is in opposition with the cementum presents a number of excavations, each circular bay being occupied by several bone-lacunæ. From its remarkable resemblance to the ordinary absorption-line, I am inclined to think that it is due to that action. The process of absorption in temporary teeth takes place alternately with that of deposition. When bone becomes absorbed, new bone is often deposited on the absorbed surface, leaving only a light tracing to indicate where the former line of absorption once existed. The same is true of cementum, but not of the other two tissues, as has already been illustrated: in these, when once the process of deposition sets in, entirely a different tissue is deposited, forming a definite division.

The other characteristics which are presented microscopically in tooth-structure very much resemble those which have been described in bony tissue.

In absorption of temporary teeth all three tissues may be attacked, and in the following order:—

1st. The cementum.
2nd. The dentine.
3rd. The enamel.

We frequently find in practice that only a portion of the crown of a deciduous tooth remains, the greater part of the tooth having become absorbed.

Tomes is of opinion that in the later stages of absorption of the deciduous teeth the pulp takes upon itself an absorbing action, and so completes the work of the papilla.

Absorption in the permanent set must be looked upon as a morbid process. It generally arises as the result of chronic inflammatory conditions existing in the dental periosteum, or the result of irritation set up by impacted permanent teeth. With regard to that arising from chronic periostitis, it occurs usually, I think, in advanced life, and in those teeth the pulps of which have lost their vitality, the process of absorption being often succeeded by exostosis. Stumps which have been pivoted nearly always eventually undergo absorption, and some instances have occurred where the pin of the pivot-tooth has been exposed in this

manner. The fangs of permanent teeth which have undergone absorption *nearly always* present that transparent appearance when held up to the light to which Salter has applied the name of "*the horny fang.*" In sections made from such teeth the structure is extremely indistinct, and the characteristics of absorption cannot be traced. The occurrence of cases where the fangs of a permanent tooth have been removed whilst the crowns have remained perfectly healthy is not nearly so frequent. The fang may be almost entirely removed, leaving little but the crown of the tooth remaining, and not giving rise to much pain or discomfort until the tooth becomes loose, and eventually falls out; but sometimes, long before it has reached this advanced stage, considerable pain and irritation is set up, which in many cases necessitates its extraction. On examination, it will be frequently found that absorption has been going on in a very irregular manner, leaving the apex of the fang extremely rough, and in many instances it will be found that quite a sharp spicula of dentine projects, which has received the common name of the "*needle point.*" In absorption of permanent teeth in this manner, the dentine and cementum, I believe, are the only tissues attacked; at least, I have never met with a case in which the enamel has been implicated, the tooth being lost before that tissue was reached. In these cases I do not know of any treatment that will arrest the progress

of the disease. With regard to absorption of permanent teeth caused by impaction, I believe those most frequently affected in this manner are the twelve-year-old molars, by irritation set up by an impacted wisdom tooth pressing upon its posterior surface. Serious mischief is often set up in this manner, and not unfrequently the pulp-cavity is laid bare, giving rise to the most acute pain and various other complications, which are sometimes very extensive; and under such circumstances I would advocate the extraction of the twelve-year-old molar, but should affairs not have assumed so grave an aspect, the removal of the wisdom tooth would in all probability be the proper course to adopt.

As disturbance may be set up by the occurrence of this process in the second set, so the same may result in the deciduous set from the arrest of it. In the front incisors it is not an unfrequent occurrence for the apices of necrosed, non-absorbed fangs to be exposed by the absorption of the gum over them, and for them to protrude, causing very painful and sometimes extensive ulcers on the inner surface of the upper lip.

Alveolar abscess and gumboil are also very frequently met with in connection with necrosed temporary teeth, which often assume a severe character, and are accompanied with great swelling, &c. &c.

Ragged temporary teeth and stumps that have

not been removed by absorption are apt to cause severe ulcers on the tongue.

Lastly, the non-absorption of temporary teeth causes great irregularity in the permanent set. The teeth which I think most frequently assume the persistent phase are the temporary molars and canines; and one can readily see what crowding the retention of the temporary molar would cause, even though its successor did not make its appearance, from the fact of its being so much larger than the premolar. Sometimes the persistent temporary tooth is retained for many years, to the exclusion of its successor, and does good service during that period. I have met with instances where a certain temporary tooth has remained persistent in each member of a family. Now the question arises whether, if there is not much crowding, it is the better practice to allow these teeth to remain or to extract them? I think that in many instances, if they be extracted, the gap may remain for a considerable period unoccupied; and should the bicuspid happen to be buried deeply in the jaw, there is some probability of the crowns of the adjoining teeth approximating, and so sufficient space not being maintained for it.

How is it that the absorbing process is sometimes arrested?

Some have advanced the theory that dead tissue cannot undergo absorption; but I do not think that will hold good, seeing that, in Dieffen-

bach's operation in Pseudarthrosis, the ivory pegs are removed in this manner. In this operation the ends of the bone are perforated, and ivory pegs are driven in with a hammer: new bone forms around them. When these pegs are extracted, they will be found to be very rough at the points where they were in contact with the bone; if these pegs be not removed, they become entirely absorbed. On microscopical examination, this ivory presents the typical appearances of absorption. Another proof of the fact that dead tissue can be absorbed is, that the dead bone which is exfoliated in *necrosis* and *caries* also presents the same appearances.

Then, how is it that we find necrosed teeth do not become absorbed?

One would think that it is not so much due to the loss of vitality in the tooth, or to any chemical change taking place in its substance, as to some alteration in the character and functions of the absorbing organ. But this is a subject possessing great room for investigation, and I should prefer to leave its solution to abler hands, and should like to hear the opinions of other members respecting it. Before closing, I must express my indebtedness to the works of the following authors for much assistance in the production of this paper: John Tomes, Charles S. Tomes, Rindfleisch, Bilroth, Völkmann, Virchow, and Green.

In conclusion, Sir, I must apologise for the many failings and shortcomings of my paper; and I must confess that it was with some diffidence that I decided upon writing it, considering that I was a junior member of the profession, and knowing that there are so many older and abler hands who would have done more justice to this subject. If I shall have been successful in raising a discussion from which I can gather a few crumbs, I shall be amply rewarded.

## Discussion.

The President thanked Mr. Harding for the evident pains which he had taken to place before the Society an accurate account of the present state of our knowledge of a very important subject. He thought that probably the latter half of the paper would afford the best materials for discussion, since this dealt with matters which bore more directly on the practice of their profession. The mode of absorption of the temporary and of the permanent teeth, and the origin and structure of the special organs by which this was effected, were subjects of the greatest interest and importance. Our knowledge on these points was as yet far from perfect; there was plenty of room for further investigation. Mr. John Tomes was almost the only English author who had written on the subject. He hoped therefore that some of the members present might be able to increase our knowledge by the result of some hitherto unpublished observations, or that Mr. Harding's paper, by showing how widely authorities differed, and how much remained to be discovered, might stimulate some to work at and to elucidate some of these obscure points.

Mr. Hutchinson thought that the Society was greatly indebted to Mr. Harding for his interesting *résumé* of the present state of our knowledge of the process of absorption. There were at least two practical questions raised which were worthy of discussion. In the first place he wished to ask those of the Members present who had met with cases of persistent temporary teeth, whether they thought the best practice was to leave them alone, or to extract them, provided, of course, that they occupied the place of a permanent tooth which was either not erupted or was misplaced. Among his patients were three members of one family who each had a temporary canine instead of the permanent tooth, which had appeared in the palate: one brother was now twenty-five years of age. Then he would ask Mr.

Harding, whether in the course of his researches, he had come across any explanation of the remarkable fact that in the case of the temporary teeth absorption proceeded more rapidly if the pulp was living, whilst if the tooth had been filled, or the pulp destroyed with caustic, the process of absorption was apt to be very slow. But in the case of the permanent teeth, it was just the reverse; dead teeth were not unfrequently absorbed, whilst absorption of a living tooth was rare. A patient had recently consulted him on account of a loose wisdom tooth: he extracted it and found that the greater part of the fangs had been removed by absorption. This was, however, due to the fact that two years before the tooth had been extracted, filled and replaced, and, as a consequence of this, had lost its vitality. Now, why should absorption take place more readily in a temporary tooth with a living pulp, than in a permanent tooth when the pulp was dead?

Mr. Charles Tomes said it was true that when the absorption of a temporary tooth had advanced to a certain stage the last fragments were absorbed very slowly, but he did not think it had been proved that it was the destruction of the pulp which caused the arrest of the process. It might, with equal probability, be due to the fact that the fragments had become displaced, and had lost their connection with the periosteum, and they were, therefore, almost in the position of foreign bodies imbedded in the gum, but having no organic connection with it. The study of comparative anatomy threw some light on this point. In creatures like the frog, or crocodile, who were provided with a constant succession of teeth, the course of events was as follows:—At the base of the old tooth, on the inner side, a small tooth-sac appeared; this gradually moved forwards, and apparently cut its way through the wall of dentine into the pulp-chamber of the old tooth, the wall of this tooth undergoing absorption as the other advanced. The young tooth-sac then increased in size until it occupied nearly the whole of the pulp-cavity of the old tooth and caused absorption of its anterior wall; at last the point fell, or broke off, and the young tooth commenced an independent existence.

In this instance, the pulp of the old tooth was destroyed by the pressure of the young sac, yet the tooth was readily absorbed, and this was effected almost without the provision of any special organ; *i.e.*, there was no absorbent papilla; the active agent seemed to be a thin layer of osteoclasts, which was to be found between the old tooth and the advancing sac.

Mr. Hutchinson explained that he had not referred to delay in the removal of the last fragments of a deciduous tooth, but to cases where the pulp had been prematurely destroyed before absorption had commenced, or before it had advanced very far, and then asked Mr. Tomes whether the growing permanent tooth, in the human subject, was coated with an absorbent organ similar to that which he had described as being found in the frog?

Mr. Tomes answered that the advancing tooth did not carry the absorbent organ; this was quite distinct. It consisted of a thin layer of absorbent cells upon, and firmly adherent to the old tooth. It was not easy to demonstrate this layer, *in situ*, in the human subject; the frog's tooth was so much smaller, and, consequently, more manageable as a microscopic object; but as the effects produced were the same in the two cases, he thought it might be inferred, with some probability, that the means by which they were produced were also similar.

Mr. Ranger asked Mr. Tomes whether he did not think that, although the absorbent organ was distinct from the advancing tooth-sac, it was really the latter which set in motion the process of absorption?

Mr. Tomes said, that although the sac and the tooth which was being absorbed were not actually in contact, but were separated by a thin layer of connective tissue, still there was an evident relation between them, since the area of absorption accommodated itself accurately to the contour of the sac.

Mr. Ranger said he was of opinion that this also held good in the human subject. He had been led to this conclusion by such cases as the following:—A gentleman, aged 45, came to him complaining of pain in a left lower second temporary

molar, which still occupied the place of the second bicuspid. He extracted the tooth, and found the fangs almost perfect; he thought this was due to the fact that the bicuspid, for some reason or other, had not come forward, and so no absorption had occurred.

The PRESIDENT remarked that he had once filled a temporary molar in a gentleman aged 67, and the tooth was then in such good condition that he had filled it with gold. He thought that what had been stated about the absorption of the deciduous teeth was very interesting. The old theory was, that these teeth had a definite period of existence, and that when this was accomplished they necessarily perished; but more accurate observation had shown that they might be as "permanent" as their successors, and that it was the approach of the so-called permanent tooth which was somehow the principal factor which determined their removal.

Mr. ASHLEY BARRETT said he had not clearly understood Mr. Harding's statements respecting the absorption of dead teeth. In one part of his paper he had spoken of the absorption of dead fangs, and later on he had said that necrosed teeth were rarely absorbed, and spoke of the mischief which might be caused by their retention. He presumed that he meant to draw some such distinction as the following between a tooth which was merely dead and one which was necrosed. A living tooth was supplied with nourishment from its pulp within, and from the periosteum without; a dead tooth was one in which the pulp had perished, and which had consequently lost its internal supply, but might still have some vascular connection with the periosteum; whilst in the case of the necrosed tooth the supply from both sources had been cut off.

Mr. GADDES said that it was, perhaps, difficult to account for the immediate cause of an osteoblast taking on the function of an osteoclast. Mr. Harding had spoken of irritation or inflammation as causing this alteration of cell-function. He (Mr. Gaddes) thought that the explanation of such was more probably to be found in an alteration in the nutrition of

the cells. It was known that cells receiving an excess of nutriment proliferate rapidly; if no excess, or even a diminished amount of nutriment was received by the cells—say osteoblasts or connective-tissue corpuscles—they would carry out their function of perfect tissue-formation—bone, or connective tissue. In that manner is there a relation between excessive nutrition and cell-proliferation on the one hand, and between a diminished nutrition and tissue-formation on the other?

The PRESIDENT observed, with reference to Mr. Barrett's remarks, that the arrest of the process of absorption seemed to be determined not so much by the mere death of the tissue as by the occurrence of putrefactive change. A temporary tooth might be dead, but so long as it remained in a pure and sweet condition it was readily absorbed; a necrosed stump, on the other hand, was not only dead but was saturated with effete purulent fluid; and it was, perhaps, fortunate that this was not readily absorbed. It seemed as if a condition of high vitality in a tissue forbade absorption, that low vitality favoured it, and that putrefactive change prevented or arrested it. He did not put this forward as an answer to Mr. Barrett's question why absorption should take place in the one case and not in the other; it was only a statement of the difficulty in another form, and in no sense an explanation of it.

Mr. CARTWRIGHT remarked, that when temporary teeth persisted till late in life, it would generally be found that the missing permanent tooth was either lying horizontally, or else that it had remained deeply buried in the jaw; as soon as it came forward absorption began. He had met with the following case of absorption of a posterior lower permanent molar caused by the pressure of an impacted wisdom tooth. He removed the molar, and the wisdom tooth at last came forward. The patient, a gentleman 63 years of age, had previously consulted another dentist, who had attempted to save the molar by extracting the wisdom tooth, but had only succeeded in breaking off one of its cusps. With regard to Mr. Harding's question whether it was better to remove persistent temporary teeth or to leave them, he was decidedly of opinion that it was

better not to interfere with them unless there was evidence of the approaching eruption of the permanent tooth.

Mr. DENNANT remarked that the prolonged retention of temporary teeth was often hereditary in families. He had met with an instance where a temporary canine and molar had persisted in two generations, the same permanent teeth being absent in each case. Mr. Harding had mentioned the fact that stumps which have been pivoted frequently undergo absorption. He had recently met with the following instructive case:—An old lady, aged 60, came to him, who had lost the crown of the left upper canine. As nearly all her other teeth were sound, he thought he was justified in pivoting a crown to the root. The operation was successful at the time, but twelve months afterwards the patient returned, complaining that the tooth was loose: on examination, he found that the root had been perforated, and the greater part removed by absorption.

The PRESIDENT having called upon the author of the paper to reply,

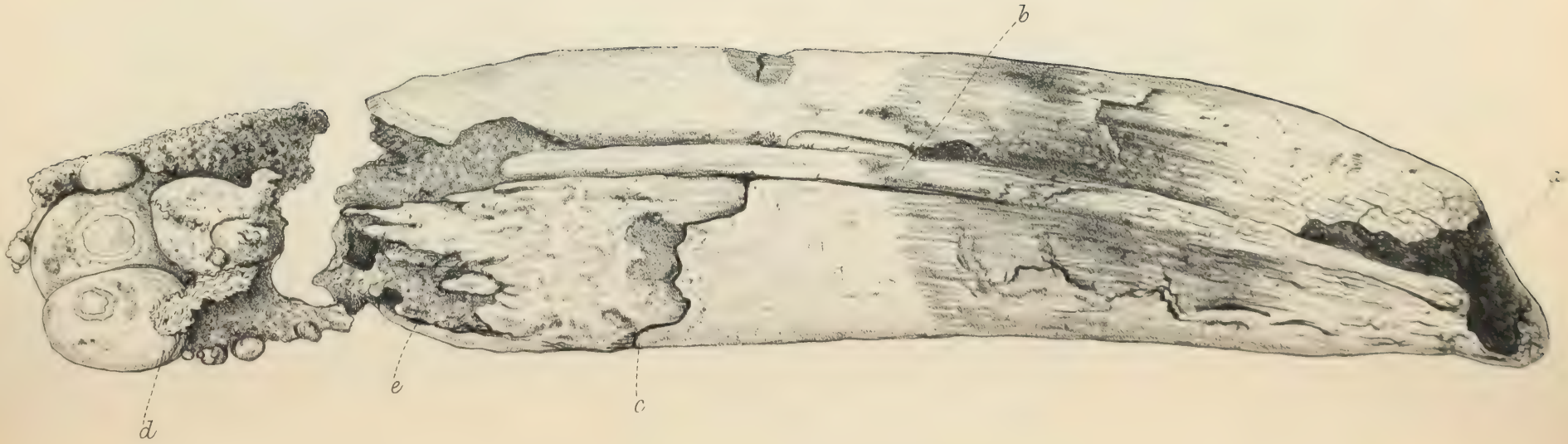
Mr. HARDING said, that before replying to the gentlemen who had asked him questions, he would mention a case bearing upon the subject, which he had intended to have alluded to in his paper. It appeared in an article by Dr. Joseph Coats in the *Glasgow Medical Journal*. "A boy, aged 16, applied at the General Infirmary with a severe lacerated wound of the leg; gangrene speedily set in, and amputation was, consequently, performed through the middle of the femur. After the operation the flaps became gangrenous, causing a portion of the bone to protrude; the stump was therefore opened up, and two inches of the bone sawn off. After this the case went on satisfactorily. In the removed portion of bone a sequestrum was found, extending nearly its whole length. The sequestrum was found, on microscopical examination, to have undergone a considerable amount of absorption; the surface was rough and eroded where it had been covered by soft tissue, whilst that portion which had been exposed was quite smooth, no absorption having taken place: a decided ridge

separated the two surfaces." This case was interesting from the fact that it showed that dead bone might, under certain circumstances, undergo absorption. For had it taken place previous to the death of the bone, the whole of the sequestrum would have been affected. In reply to Mr. Hutchinson, he thought that in most cases where the fangs of dead deciduous teeth had failed to be absorbed, both the cementum and dentine had become necrosed. With regard to the question asked by Mr. Ashley Barrett, when he spoke of dead fangs in the early part of his paper, he referred to permanent teeth with dead pulps, whilst later on, when speaking of necrosed fangs, he referred to the deciduous set. In answer to Mr. Gaddes, he was aware that many authors were of opinion that the osteoblasts were capable of performing the function of osteoclast cells. At the same time he would mention that the latter were much larger than the ordinary bone-forming cells, and had therefore received the name of "giant cells"; their outlines also were very irregular, and they possessed many divergent processes.

After the usual vote of thanks, the PRESIDENT announced that on the next occasion a discussion on the Nature and Treatment of Riggs' Disease would be opened.

The meeting then terminated.

158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# ORDINARY MONTHLY MEETING,

*June 3rd*, 1878.

ALFRED COLEMAN, Esq., President, in the Chair.

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The Minutes of the previous Meeting were read and confirmed.

The following gentlemen signed the Obligation Book and were formally admitted to Membership by the President.

John Laws, Esq.
Thomas F. Pedley, Esq., and
F. H. Benham, Esq.

Mr. W. T. Woods, of Calcutta, was proposed by the Council for election.

The following gentlemen were then balloted for and unanimously elected Members of the Society, viz. :—

Storer Bennett, 17, George-street, Hanover-square, L.R.C.P. London, M.R.C.S. England, L.D.S., R.C.S., Resident.

G. C. Daboll, Paris, Buffalo, New York, D.D.S., Non-resident.

T. G. T. Garland, 2, Stafford-villas, Heavitree, Exeter Non-resident.

James Merson, 35, Harley-street, W., L.D.S., R.C.S.

The President having announced the result of the ballot,

Mr. Underwood rose and said he found that he had given his vote under a misapprehension. He had asked the Secretary when the box was brought round what candidate was being

balloted for, and he understood him to say "Mr. Storer Bennett"; he now heard that *four* gentlemen had been elected. He had no reason to suppose that any one of the four was not worthy to be a member of the Society, but he thought the present haphazard plan of election dangerous, and greatly preferred the good old rule of balloting for each candidate separately.

The PRESIDENT said the present plan had been introduced because it had been found that passing round the ballot-box for each of a number of candidates separately occupied a good deal of time and distracted the attention of members from other business. If any one of the candidates should be considered objectionable, all should be black-balled at the first ballot; the box would then be sent round for each candidate separately, and the objectionable individual would thus be eliminated. He would send the box round again if Mr. Underwood had any doubt respecting any of the candidates, but if it was only the manner of voting to which he objected, he (the President) would suggest that Mr. Underwood should bring the matter before the Council at their next meeting, and he felt sure that it would receive their most careful consideration.

Mr. UNDERWOOD said he did not think that the passing of the ballot-box need interrupt the Casual Communications; but even if it did cause a certain amount of inconvenience, he should look upon this as of small account in comparison with the welfare of the Society, and he believed it to be a point of vital importance that the elections should not be hurried over in a slovenly manner. He would take the first opportunity of bringing his views before the Council.

In the absence of the Curator, the President brought forward two contributions to the Museum. The first was a cast of the jaw of an aged negress, sent by Mr. Rutterford. The jaw, which was edentulous, was remarkable for its great size. The President remarked that it was a pity the cast had not been taken whilst the teeth were *in situ*; for if their size was pro-

portionate to that of the jaw, the *tout ensemble* must have been very striking.

Mr. O'Meara (of Simla) had presented the head of a young alligator. The donor stated the species to which this specimen belonged was one of the most innocent of the tribe, for it lived upon fish and did not attack men. When full-grown they measured about 30 ft. in length.

The President then handed round a regulating-plate contrived by Mr. J. S. Turner, in which the action of the ordinary hickory peg was aided by the application of a spring. A piece of ordinary watch-spring was riveted on to the plate; at the free end of the spring was a gold eyelet, and in this a wooden peg was fixed, its length being increased from time to time as the tooth moved.

Mr. Pedley showed the form of regulating-plate which he had been in the habit of using for some years. Instead of wooden pegs or springs, he turned up a flap of vulcanite from the plate just behind the tooth, and attached to this by means of silk a small block of india-rubber, so cut as to exert moderate pressure on the tooth. As the tooth moved, the size of the pad could be increased, or, by slightly warming the plate, the flap could be brought further forward.

Mr. Woodhouse said he had long been in the habit of using a similar plan, differing only in the manner of securing the block: he drilled a hole through the plate and passed a loop of rubber through.

Mr. Oakley Coles exhibited a specimen of Ozokerine which had been sent by Messrs. Field. It was a product of petroleum, and was in all its properties very similar to the substance called Vaseline, which had lately been coming into use, but had the advantage of being much lower in price. It would be found useful as a substitute for soap or oil, for coating Stent's composition or for preventing adhesion between wet plaster casts.

Mr. Oakley Coles also showed a modification of the clinical

thermometer which he was in the habit of using occasionally for taking the temperature over inflamed teeth.

Mr. RANGER asked whether Mr. Coles had found the thermometer of any practical utility: did he find any sensible difference between the temperature of an inflamed tooth and its neighbours?

Mr. COLES said that a decided elevation of temperature could be demonstrated by the thermometer over the focus of the inflammation; but as this was generally indicated by other evident signs, the use of the instrument for this purpose was, in most cases, rather a matter of scientific interest than of practical use.

Mr. COLES said he wished to call the attention of members to a communication from Dr. Buck, which appeared in a recent number of the *St. Petersburg Medicinisch Wochenschrift*, respecting the action of salicylic acid on the teeth. This substance is a powerful antiseptic, and is often prescribed on this account. Dr. Buck had been in the habit of brushing his teeth with a lotion containing about three parts of the acid to 100 of water. After a few weeks he noticed that the surface of the teeth was becoming soft and granular, and on grinding them together there was a feeling as if some grit or sand was interposed. Further investigation convinced him that this was no illusion, that the acid did really destroy the surface of the teeth by entering into combination with some of their constituents. Dr. Buck thinks that a salicylate of lime is formed, and he therefore warns the profession and the public against the use of this substance as a lotion for the mouth or teeth.

In the absence of Mr. Chas. Tomes, the Secretary then read the following communication respecting Slayton's Amalgam, which had been sent to the committee by Mr. William Foster, the Lecturer on Chemistry at the Middlesex Hospital Medical School.

"GENTLEMEN,

"*Slayton's Amalgam* (*Felt Foil*).

"I have recently examined a specimen of this amalgam at the request of some members of this hospital. I understand that the substance has not been before the members of the Dental Profession for a great length of time; a knowledge of its composition may therefore be of some interest. I am strengthened in my opinion on this point in consequence of some conversation I have had with several of my pupils, from whom I learn that the general impression is that it does not contain mercury.

"It consists of three metals,—tin, mercury, and silver, and the following are the proportions of these components in 100 parts :—

| | |
|---|---|
| Tin..... | 84·9 |
| Mercury ..... | 10·3 |
| Silver..... | 4·0 |
| Error from loss, &c., | ·8 |

"The details of the analysis were of the ordinary kind, and are devoid of interest.

"I am, Gentlemen, yours, &c.,

"WILLIAM FOSTER, B.A. (Cantab.), F.C.S.,

"*Lecturer on Chemistry,*

"*Middlesex Hospital Medical College.*"

Mr. HENRY SEWILL then said :—Mr. President, during a discussion on gout at a recent meeting of the Harveian Society, the latent form of the disease was referred to, and some remarks were made respecting the difficulties of the diagnosis in such cases. Amongst other aids, the importance of an examination of the teeth was insisted on by some of the speakers. I must confess that the facts then mentioned were new to me; and as I thought that possibly some other members of this Society might be equally ignorant, I have brought the subject before you this evening. I had never seen any mention of the effects of gout on the teeth in any book on Dental Surgery, and on inquiring of Dr. Milner Fothergill, he could only refer me to

the lectures of Professor Laycock, of Edinburgh. Dr. Laycock says the teeth of gouty subjects, so long as the disease maintains the sthenic form, "are massive, well enamelled and regular, undecayed even in advanced life. I have observed that the teeth often come out undecayed, and that such teeth are apt to be worn down, though free from caries, probably from the action of uric acid in the saliva; for the saliva of such persons is usually somewhat acid, though I am not in a position to say what acid it is. The teeth of the gouty, especially of the sthenic form of gout, are very characteristic and their peculiarities are commonly sufficiently well marked to be diagnostically useful." Dr. Stewart, of Southwick-street, Hyde Park, who also spoke on this subject at the meeting of the Harveian Society, has taken a number of casts of the teeth of gouty patients, which I will hand round: they fully confirm the accuracy of Dr. Laycock's description. It is especially important for us to recognize the connection of extreme erosion of the teeth with the gouty diathesis, since this will give us a valuable hint as to treatment.

Mr. Woodhouse said he had often noticed the peculiar teeth of gouty patients—massive, generally yellowish in colour and eroded, but not subject to decay. His attention had been specially drawn to the subject some years back by the following case:—A gentleman, a gouty subject, having lost an incisor, Mr. Woodhouse supplied another, carefully imitating in size and shape the corresponding tooth which remained. But when the patient returned after a year or two, the new tooth was found to be decidedly larger than the old one, and after another interval the difference was still more marked. Further examination showed that the other teeth were similarly acted on: they appeared to be slowly melting away.

Mr. Oakley Coles suggested that Mr. Sewill would find some further information on the subject in Dr. B. W. Richardson's work on "The Medical History and Treatment of Diseases of the Teeth," published in 1860 by Baillière.

The President said he could readily confirm the accuracy of

the description they had just heard. Although in most books erosion was treated of under the same head as caries, they were probably quite separate diseases, due to different causes and requiring different treatment.

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## Discussion on the Nature and Treatment of the so-called Rigg's Disease.

The President announced that Mr. Chas. Tomes, who was to have opened the discussion, had unfortunately been prevented from attending the meeting that evening; but he had sent a short statement of his views, which would now be read by the Secretary.

Mr. Tomes's letter was as follows :—

"My dear Coles,

"As I am unable to be present at the discussion, in which I am much interested, and should be very glad to have many points in the pathology of the disease elucidated, I would suggest that the experience of our members should be gathered in reference to the following points.

"(1.) The frequency of the occurrence of the disease in persons of middle life who manifest no other sign of senile degeneration; its occasionally sudden advent; its sometimes acute and comparatively painful course; the abundance of discharge in acute cases; its occasional curability. To me personally these characters would be sufficient to establish its distinctness.

"(2.) The earliest signs of trouble and the results of treatment would seem to point to the immediate margin of the alveoli (and doubtless their periosteum) as the primary seat of trouble; and the diseased action not to differ much from caries of bone; but on this matter evidence is very much needed.

"(3.) I have certainly seen cases in which I could discover no tartar; these were in an early stage, but still the disease was

thoroughly well-marked. On the other hand, the occurrence of a small quantity of tartar within the gum is exceedingly common, whilst the disease is comparatively rare. Again, when tartar is present it is often situated some distance above the site of active destruction of the alveoli which is thus going on beyond the range of the tartar. And further than this, tartar is abundantly found on the roots of teeth which have been slowly bared by ordinary senile loosening, and which have presented none of the characteristics of the more rapid disease. So that the conditions under which tartar has, and has not, been met with, so far as my own observations go, would preclude the idea of its having anything more than an accidental connection with the disease. But on this point the experience of a single individual is too small for the drawing of a certain conclusion.

"Regretting my unavoidable absence from the meeting,

"I am yours very truly,

"CHAS. S. TOMES."

The Secretary then read the following letter from Dr. Arkövy :—

"BUDAPEST, *May 28th*, 1878.

"MY DEAR SIR,

"The announcement that Mr. Chas. S. Tomes will open a discussion at the next meeting of the Odontological Society on the so-called 'Rigg's Disease,' gives me great pleasure, inasmuch as I hope to profit by the observations of our excellent fellow-practitioner. All who are engaged in paying attention to oral surgery, besides dentistry *strictissimo sensu*, know how great an importance this disease has, which will be, as I hope, enlightened at your meeting.

"The original paper, where Rigg described the disease is not in my possession, but by comparison I see that it is very likely the same that we find described by J. Salter, under the title 'False Scurvy' ('Dental Path. and Surgery,' p. 184), and by John and Chas. S. Tomes as 'Absorption of the Alveoli' ('Syst. Dental Surgery,' pp. 511–514); and while the latter

remarks that the disease is 'very intimately connected with chronic inflammation of the gums,' both agree in the opinion that 'the causes and pathology of the disease are very obscure' (Tomes), and 'are neither constant nor always intelligible' (Salter). As the best proof of the want of clear intelligence and well-based apprehension on the matter may be regarded the manifold nomenclature used for it; as—besides the above-named—*Pyorrhœa alveolaris*, which is only a symptom; 'Catarrhal Inflammation of the Gum and Root-membrane,' &c.

"These circumstances and the urgent daily requirements of practice gave me the motive to inquire into the ground of the subject with all means in my power, and I may say the trial has not been without result; as to success others will decide.

"During the past year I have been engaged in carefully collecting data concerning specially the etiology and pathological anatomy of the disease, which still wants its own proper scientific name. A good many cases, directed by colleagues, have come under my observation, but I do not yet find them sufficient to consider the inquiry as duly concluded. There are the microscopical details which are still unfinished, and some minor points belonging to the etiology: notwithstanding I hope you will *for now* kindly remit these details and give me the permission to bring to your kind notice the promise that, as soon as I shall have completed the inquiry, I intend to submit my observations for discussion to the Society: I think three or four months will suffice for the purpose.

"At this occasion, please allow me to give utterance to my hearty thanks for the appreciation with which you kindly remembered me in your Presidential Address in February; I assure you it only instigated me to answer by a new trial. This month I began, at the Institution for Experimental Pathology and Pharmacology of the University, some vivisectional experiments on dogs, to get clear about the still open question whether secondary dentine can be produced after removing a certain part of the odontoblast layer of the living pulp, and if so, how and by what means. I am obliged, as you know, to wait three or four months at least for the result.

If I get such, I shall offer the paper, with drawings, in its full extent, to the Society.

"Do not be angry at the trouble I give you, and please receive the assurance of my best thanks in advance.

"Yours faithfully,

"Dr. Jos. Arkövy."

Mr. Oakley Coles then opened the discussion with the following address :—

## *On the so-called Rigg's Disease.*

By Oakley Coles.

Mr. President and Gentlemen,

The naming of any disease after the first person who may have described it is generally a source of inconvenience and misunderstanding. In the case of fractures of certain bones in a particular manner, it may not be of so much moment,—as, for instance, in Pott's fracture and Colles' fracture; but when in place of a distinct and well-marked injury to a bone, we have a pathological condition with which we are only imperfectly acquainted, giving rise to certain local manifestations, of which it is not easy to say whether they are causes or effects of the diseased condition, the inconvenience of a "personal" nomenclature becomes at once apparent. Names, if they are to be really useful, should be based upon some easily recognized pathological change, or some well-marked and more or less persistent symptom; as, for instance, such names as Hypertrophy of the Gums, Radicular Odontome. I make these remarks with no desire to lessen or detract from the honour due to Dr. Rigg, of the

United States, for being the first to fully enter into a description of a lesion that had previously been but vaguely and uncertainly alluded to.

That the condition known as "Rigg's Disease" is a distinctly marked pathological state requiring a special name there can be no doubt.

What that name shall be, may, I think, be wisely left until we are better acquainted with the processes by which a clearly recognizable result is brought about. Meantime it may perhaps be useful to bring together our experiences, with a view to the elucidation of the question.

My attention was first drawn to the matter under discussion nearly thirteen years ago, when I was called upon to remove the tartar from the teeth of a well-known and very hard-working contractor. The lower teeth were all perfect, with only a small amount of tartar on the lingual side of the lower incisors; the upper teeth, however, were covered with a greater amount of tartar, especially on the labial surface of the molars; there was a slight amount of tartar on the bicuspids and incisors, still only a little in excess of that which I found in the lower jaw; the margins of the gums were slightly thickened and everted, but the rest of the mucous membrane was healthy and not inflamed, the gums were free of cast-off epithelium, and the papillæ only slightly enlarged.

The teeth were of a bony yellow colour, and soft in texture and semi-translucent in appearance.

The palatine fangs of the upper molars were exposed nearly to their apices, and a roughened surface, doubtless due to minute nodules of tartar, could be felt on the labial fangs; over the left upper central and lateral incisor, a curious recession of the gum had taken place, leaving the necks of those teeth partially exposed.

The area of the recession was distinctly circumscribed and limited to the region of the teeth I have named.

During the last twelve years I have, of course, seen many more cases of a somewhat similar character, and so far as my observations have gone, the disease occurs most frequently amongst men who are subjected to great mental strain. I have found it especially prevalent amongst civil-engineers, physicians, and barristers.

It also occurs with those who have recently returned from India, and especially where the patients have suffered from jungle fever.

Amongst women it is most prevalent after exhausting illness, after frequently-recurring pregnancies, and also associated with an excessive menstrual flow.

My observations have thus led me to the conclusion that the condition is to be classed with "the diseases of modern life," that is, that it is

dependent on diverted or impaired nutrition, and is to be regarded as a local manifestation of a general constitutional condition. It may in many respects be looked upon as localized premature senility.

And this view will, I think, explain the cause of some of the symptoms.

In the so-called "Rigg's Disease" we have absorption of the dental periosteum and the deposition of granulated particles of tartar attached to the denuded fangs of the teeth; these symptoms may or may not be associated with a recession of the gums and alveolus, whilst the expulsion of the tooth from its bony socket will depend upon its position relatively to the other teeth. Incisors will be generally erupted, whilst molars and bicuspids that have not lost their antagonists will, as a rule, remain on the normal horizontal plane.

It will be seen that we have in the cases under consideration symptoms strongly resembling those that arise during pregnancy and lactation, and which, as I pointed out in a paper that I had the honour of reading before the Society, are doubtless due to impaired local nutrition.

The point will, I think, scarcely be disputed, that an excessive strain or use of any organ or viscus will produce some local manifestation of impaired nutrition more or less remote from

the abnormally nourished region. That the evidences of impaired nutrition should be most clearly manifested in those organs with a low vascular supply might, *à priori*, be reasonably expected, and is fully borne out by our knowledge of facts. If we accept this view, we are left the less in doubt as to the cause of the so-called "Rigg's Disease," and the relation between the absorption of the periosteum of the tooth and the deposition of the tartar on the fangs.

Turning now to the more local points of interest, we find the tartar, instead of being deposited in layers or smooth masses, is granulated and nodulated in appearance, and resembles the "mulberry-stone" variety of urinary calculus. I am inclined to attribute this condition of the tartar not to any special form of chemical precipitation of the salts, but simply to the "accident of opportunity." The tartar is deposited at the points of least resistance, that is, on that part of the tooth corresponding to the depressions on the cancellated surface of the softened alveolus, and it is on account of this intimate relation between the two that it has been found so beneficial (as Dr. Field pointed out in his interesting communication on the subject) to scrape and cut away portions of the alveolus in addition to thoroughly cleaning the fangs of the teeth.

The question will probably arise as to why this condition of the deposition of tartar should occur in middle life and not in old age, when the process of senile decay is more complete.

The statement of the case contains an explanation within itself, I think. It is precisely because the conditions of senile decay are complete in the mouths of those aged people who have retained some of their teeth, that we do not find any deposition of tartar (as a rule) upon the fangs.

In old age the changes in the texture of the tooth, the atrophy of the periosteum of the fang, and the recession of the gum and alveolar processes take place gradually, but co-incidently, and the margin of the gum remains to the last in close contact with the fang of the tooth; so much so, that the pain of extracting one of the loose teeth of old patients is often very great.

In the cases we are now speaking of we have a more or less sudden cutting off of the vascular supply, and subsequently to the atrophy of the periosteum, absorption, leaving a *cul de sac* in which the tartar becomes deposited. Free access to the alveolar cavity having been once established, it is easy to understand how the process of loosening is hastened by the irritation of such foreign bodies as minute granules of tartar deposited on the fangs of the tooth.

The alveolus and gums being extremely vascular, do not recede at the same time that the periosteum becomes absorbed; and hence we have the tooth surrounded with bone and mucous structures, but loose in its socket.

I have thus endeavoured to show that the condition hitherto known as "Rigg's Disease" is due to impaired nutrition and atrophy of the periosteum of the fang of the tooth, whilst the appearance of the tartar deposited on the fangs is owing to the nature of the surfaces that form the boundaries of the *cul de sac*.

If the view of the case I have brought forward meet with the support of the profession, we shall probably have taken one step towards finding an accurate name whereby we may scientifically speak of this disease, for directing attention to which we are indebted to Dr. Rigg.

## Discussion.

The President remarked that the disease which they had met to discuss was certainly one of the most distressing and intractable with which they had to deal, and though many might consider its present name inconvenient, all would feel grateful to Dr. Rigg for having grappled with it. In spite of that gentleman's labours, neither the precise nature of the disease nor the best method of treatment could be said to be as yet definitely settled. He hoped that the discussion that evening might do something towards deciding some of the doubtful points connected with it. He would suggest that it would be well if members would take Mr. Tomes's brief and clear statement of his views as a model, and follow as much as possible the order of the questions on the papers which had been circulated among them. Dr. Field had lately exhibited Dr. Rigg's instruments before the Society, and had shown that he had had considerable experience in the treatment of this disease; he should be glad to hear if he could add anything to the observations he made on that occasion.

Dr. Field said he was glad to have the opportunity of stating that Dr. Rigg did not claim to be the discoverer of the disease which now bore his name, but only of a satisfactory method of treating it; and of the success of this treatment he (Dr. Field) had had ample proof. As to the origin and nature of the disease he thought that it was quite distinct from senile degeneration, and that in many cases it was not the result of any general disease, though it might be greatly aggravated by constitutional weakness or general malnutrition. He considered that it was a local disease, and that it was due to

neglect and uncleanliness on the part of the patient. The success of Dr. Rigg's treatment confirmed this view. Quite recently a patient had come to him in a wretchedly low and weak condition, and with her teeth in such a state that a very severe course of treatment was necessary. Had the disease been the result of debility, one would have expected that the treatment would have increased this; but, on the contrary, she quickly recovered her health, and out of twenty-six teeth all greatly diseased, all were saved except two. He had not yet met with a case in which no tartar was present, and he thought that, in cases when it appeared to be absent, a careful examination *between the teeth* would reveal its presence. In fact, he looked upon the accumulation of tartar as the starting-point of the disease: the deposit encroached on the gum, which receded; irritation and inflammation was set up round the margin of the alveolus, and this finally led to necrosis. As to the treatment, he had explained this so fully on a former occasion that he felt it was unnecessary to repeat the details, but would only insist upon one point; viz., that besides the removal of the tartar, it was most important, in order to obtain a successful result, to remove entirely the necrosed part of the alveolus.

The PRESIDENT said he was glad to see Dr. Coffin present; as he knew he had given much attention to the subject, he hoped Dr. Coffin would give the Society the results of his experience. What was his opinion as to the origin of the disease? Did he consider it local or constitutional? Was it always due to neglect, or might it occur independently of this?

Dr. COFFIN said he had not attended the meeting with any intention of taking part in the discussion, and would rather have remained a listener, still he would endeavour to answer the President's questions. Strictly speaking, the disease was local, and he treated it as such; but its course might be materially influenced by the general condition of the patient. The primary cause was the presence of foreign matter about the teeth, though in some cases the local accumulation of tartar might be small. The next constant symptom was the

secretion of acid offensive mucus from the gums. As to the best method of treatment, it was simply that which common sense would suggest,—the removal of the tartar, the correction of the vitiated secretion by antiseptic applications, and by stimulating the blood-vessels about the necks of the teeth. The principal remedy he used was carbolic acid; he applied this freely and persistently round the teeth under the edges of the gums, by means of a pointed stick of wood. The first effect of this was to cause a copious discharge of dark blood and matter, and it was also attended with a good deal of pain; but after one or two applications very little pain was felt, and the discharge rapidly lessened. This should be repeated once or twice a week until the discharge ceased. After using the carbolic acid, he painted the gums freely with iodine. He found it better to apply the acid before attempting the removal of the tartar, as the sensitiveness of the gum was thus lessened, and the tartar could then be removed with less pain.

The PRESIDENT said he had been informed that certain tribes in India lost their teeth at an early age; that these organs, though quite sound, dropped out at the age of forty-five. It had been ascribed to their constant use of soft food. Perhaps Mr. O'Meara could give them some information on this subject, and would tell them whether the loss of the teeth was attended by any symptoms which would throw any light upon the disease they were now discussing.

Mr. O'MEARA said it was a fact that, not in a certain tribe only, but all over India, men lost their teeth in this way. He could give no cause for it; the men were healthy, tolerably cleanly in their habits, and their food was sufficiently varied. There was no apparent disease about the teeth, excepting the presence of tartar; but in some cases even this was absent, and the disease consisted only of absorption of the alveolus and loss of the teeth: men began to lose their teeth at thirty, the lower incisors generally going first. It was curious that this was only the case in the plains of India; in the hills the natives are more robust, but they are subject to dental caries.

Mr. RANGER said that though the effects of Rigg's disease and of senile atrophy were similar as regarded the loss of the teeth, he thought that they were distinct pathological processes. The former occurred generally in young subjects: he had lately been treating a young woman only twenty-three years of age. According to his experience, the first sign of the disease was an inflamed state of the gums; loose swollen tongues of gum were seen round the necks of the teeth, and there was a watery putrid-smelling discharge. Then the fangs began to be denuded and a nodular deposit of hard tartar could be seen surrounding the necks of the teeth; lastly, the disease attacked the margins of the alveoli. He agreed with Dr. Field that the primary cause was neglect, and that the tartar played a very important part in the destructive process; accumulation of tartar alone was sufficient to cause loosening of teeth in cases where the more acute symptoms of this disease were absent. The treatment he made use of, besides the removal of the tartar, was to apply round the teeth, by means of a brush, a mixture of Tinct. Catechu and Sp. Camphoræ; he also, in most cases, ordered the patient to take a mixture containing chlorate of potash, and to use dilute Condy's fluid as a lotion for the mouth.

The PRESIDENT said the discussion had been interesting and instructive, though in the short time available it was impossible to arrive at any distinct conclusion; indeed, several interesting points connected with the disease had not even been touched upon. As to the nature of the disease, two views had been brought forward,—the local and the constitutional. He, himself, was inclined to the latter conclusion, for he had met with the disease in very cleanly people and had seen teeth come out, though quite free from tartar. He thought that the subjects of glandular struma were specially liable to this disease. Its starting-point seemed to be hyperæmia of the mucous membrane of the gum; but what produced this he could not say. Then, as to treatment, he could not say that he had found it as simple and satisfactory as might have been inferred from some of the accounts he had heard that evening;

indeed, in some cases he had tried in vain all the remedies he could think of. He thought that further investigations into the causes of the disease were required: if these could be satisfactorily cleared up, the proper treatment would follow as a matter of course.

The PRESIDENT said the Society would now adjourn until the first Monday in November. They had already several interesting papers promised for the concluding part of the session, and he hoped that members would reassemble for their discussion with renewed health after a pleasant vacation.

# INDEX.

Abscess, alveolar, the radical cure of, 9.
Absorbent papillæ, 133.
Absorption, the process of in bone and tooth-structure, 129; review of authors who have written on the subject, ib.; definition, 130; its connection with the formation of bone, ib.; the changes in the dental alveoli, 131; the crypts, ib.; description of the histological appearances in absorption, ib.; Howship's lacunæ, 133; the absorbent papillæ, ib.; canaliculization, 134; pathological aspect of the subject, 136; the shedding of the temporary teeth, 141; absorption in the permanent set, a morbid process, 144; effects of non-absorption of temporary teeth, 147; arrest of the absorbing process, ib.; necrosed teeth, and the causes of their non-absorption, 148.
Aconite and chloroform as a dressing, 13.
Address of the President (Mr. Cartwright) on retirement, 49.
Address, inaugural, of the President (Mr. Coleman), 65.
Administration of gas and ether, new apparatus for, by Mr. Coleman, 78.
Allen, Dr., inventor of the system of continuous gum-work, 2.
Alveolar abscess, the radical cure of, 9; much remains to be learned on the subject, 10; extraction the most "radical" cure, 11; useful preservation of teeth, the limits of, 12; classification of cases, ib.; "gumboil," presence of, ib.; mode of operation, 13; aconite and chloroform as a dressing, ib.; necessity for thoroughness in cleaning out the fang, ib.; use of carbolic acid, 14; avoidance of water and glycerine, ib.; other preparations for filling, 15; conservative antiseptic dentistry, 16; authorities on the subject, ib.; conservation of the tooth by creosote and morphia, 17; arsenic as a permanent dressing, ib.; cases cited, 18; the pure carbolic acid treatment best adapted for the purpose, 19; diagnosis of the seat of, 20.
Amalgam, Dr. Slayton's, 75.

Amalgam-carrier and plugger, new, by Mr. Stocken, 46.
Amalgams, appointment of a committee to report on, 103.
American Medical Association, donation to Library by, 2.
American dentists and gold manipulations, 68.
Anæsthetization, should be complete in operations, 83.
Annealing lamp, new, by Dr. Field, 106.
Annual General Meeting of the Society, 45.
Apparatus for administration of gas and ether, new, 8.
Arkövy, Dr., on the so-called Rigg's disease, 166.
Aromatic sulphuric acid in alveolar abscess, 22, 23.
Arsenic in alveolar abscess, 20; devitalization of the pulp produced by causing periodontitis, 103.
Auditors, appointment of, 43.

B.

Balloting for members, conversation concerning, 160.
Barrett, Mr. Ashley, on Symmetrical Extraction of Teeth, 33; case of extraction of a sixth-year molar, ib.; other analogous cases, ib.; a guide to treatment derived from them, ib.; objections replied to, 36; age of the patient, 37; the advance of teeth and its course, ib.; models illustrative of the subject, 38; reply to discussion, 42; on the proposed licences in Dental Surgery, 56; on the proposed new bye-law, 58; on the diagnosis of hysteria, 85; on the treatment of exposed pulp, 101; on periodontitis resulting from devitalization of the pulp by arsenic, 103; on the expansion of the alveolar arch, 121; on the absorption of dead teeth, 154.
Barrett, Mr. Henry, on the proposed licences in Dental Surgery, 56.
Bell, Mr. Martin Luther (Canterbury), elected non-resident member, 1.
Benham, Mr. George A. C. (Leeds), nominated for non-resident membership, 45; proposed for non-resident membership, 63; elected, 79.
Benham, Mr. F. H., admitted to membership, 159.
Bennett, the late Mr., observations by Mr. Cartwright on, 51.
Bennett, Mr. Storer, elected resident member, 159.
Bevers, Mr. H. A., admitted resident member, 2.
Bloom, Mr. Mark J. (Dublin), nominated for non-resident membership, 25; elected, 63.
Bone-work with natural teeth, 102.
Brewster, Mr. (Cheltenham), contrives a new modification of Trill's vulcanite flask, 29.
Bright, Mr. C. S. (Genoa), nominated for non-resident membership, 45; proposed, 63; elected, 79.
Brookhouse, Mr. Robert, specimen by, illustrating Howship's lacunæ, 143.
Browne, Mason M., exhibits specimen of geminated molar and wisdom tooth, 107.
Brunton, Mr. George (Leeds), nomi-

nated for non-resident membership, 25; elected, 63.

Buck, Dr., of St. Petersburg, on the action of salicylic acid on the teeth, 162.

C.

Calcification, dentine, 87.

Canaliculization, 134.

Canton, Mr., on extraction for correction of dental irregularities, 121.

Carbolic acid in the radical cure of alveolar abscess, 19; application of to exposed pulp, 100.

Caries, the varied theories concerning, 70.

Cartwright, Mr. S., on symmetrical extraction, 39; precautions for preventing overcrowding, ib.; objections to the practice, ib., 41; on the work of the Odontological Society during the previous year, 50; on the papers read, ib.; on deaths of members, 51; on the qualification for membership of the Society, 54; on the process of absorption, 155.

Catlin, Mr., on the treatment of dental irregularities, 120.

Cheoplastic process in continuous gum-work, 4.

Clasps, pain caused by, 46; how removable, 47.

Coffin, Dr., his appliance for expansion of the dental arch, 111; on the so-called Rigg's disease, 177.

Coleman, Mr., on Rogers's saliva-pump, 6; on arsenic as a cure for alveolar abscess, 20; on the position of the profession, and how influenced by the new Medical Act, 66; on the paucity of workers in Dental Anatomy and Physiology, 66; on dental surgery, 67; the Dental Hospital, 68; dental degeneracy, 69; on dental pathology, 70; dental caries, ib.; irregularities, 70; on Dr. Slayton's new amalgam, 76; new apparatus by, for administration of gas and ether, 78; on hysterical mania and its treatment, 84; on the use of artificial light, 85; on the formation of dentine, 98, 100; on certain points in the treatment of dental irregularity, 109; on expansion of the dental arch as a mode of correcting irregularities, 109, 125; on treatment of dental irregularity, 119, 122, 123, 125; on the process of absorption, 151, 154, 155; on the teeth of gouty subjects, 165; on the treatment of the so-called Rigg's disease, 176, 179.

Coles, Mr. Oakley, on the prevention of overcrowding, 40; reply to, by Mr. Cartwright, 41; on the proposed new bye-law, 55; on the action of carbolic acid on the odontoblast cells, 100; on a specimen of "ozokerine," 161; on a modification of the clinical thermometer, 162; on elevation of temperature produced by inflammation, ib.; on the action of salicylic acid on the teeth, 162; on the teeth of gouty patients, 164; on the so-called Rigg's disease, 169.

Committee on Amalgams, appointment of, 103.

Communications read by Mr. Crapper, on Continuous Gum-work, 2; by Mr. Claude Rogers, on a new Saliva-pump, 6; from Mr. Dunn, on Dr. Slayton's Amalgam,

26 ; by Mr. Gaddes, on a case of Hysteria, 79; by Mr. Ashley Barrett, on Periodontitis, 103; from Mr. William Foster, respecting Slayton's Amalgam, 162; from Mr. Charles Tomes, on the so-called Rigg's disease, 165; from Dr. Arkövy, on the same subject, 166.

Conservative antiseptic dentistry, 16.

Continuous gum-work, *see* Gum-work, 2.

Councillors, election of, 54.

Coxeter's aspirator in alveolar abscess, 21.

Crapper, Mr., on continuous Gum-work, 2.

Curator of the Society's Museum, election of, 54; vote of thanks to the, 53.

D.

Daboll, Mr. G. C. (New York), elected non-resident member, 159.

Deaths of members, 61.

Deciduous teeth, desirability of preserving, 21; Dr. Slayton's stopping for, 26.

Dennant, Mr., on the proposed new bye-law, 58; on the process of absorption, 156.

Dental anatomy and physiology, paucity of workers in, 66.

Dental degeneracy, 69.

Dental surgery still incommensurate, 67; vastly improved in last few years, 68.

Dentigerous cysts, case illustrative of the pathology of, 7.

Dentinal fibrils, calcification of, 96.

Dentine calcification, 87; how healthy dentine is built up, 88; development of typical vaso-dentine, ib.; plici-dentine, 90; osteo-dentine, ib.; globular masses of dentine, 91; odontomes, 92; normal odontoblast calcification, 94; calcification of the dentinal fibrils, 96.

Devitalizing, alleged action of arsenic in, 21.

Diagnosis of the seat of alveolar abscess, 20.

Diploma, dental, as a qualification for membership of the Society, 54; discussion on, ib.

Discussions: on the conservative treatment of alveolar abscess, 20; on the symmetrical extraction of teeth, 39; on the proposed dental diploma, 54; on some forms of dentine calcification, 98; on treatment of dental irregularity, 119; on the process of absorption in bone and tooth-structure, 151; on the so-called Rigg's disease, 176.

Donations to Library: by Mr. F. Mason, of his work on "Harelip and Cleft Palate," 2; by M. Magitot, of his work, "Traité des Anomalies du Système Dentaire," ib.; "Transactions of American Medical Association during 1876," Prize Essays of same society, ib.

Donations to Museum by Mr. Mummery, of the skeleton of an elephant's head, 25; by Mr. Richardson, of ossified roots, 106; by Mr. E. B. West, of an antique extracting instrument, 127; by Mr. Rutterford, of a cast of the jaw of an aged negress, 160; by Mr. O'Meara, of the head of a young alligator, 161.

Dressing, aconite and chloroform, 13.

Dunn, Mr. (Florence), on Dr. Slayton's new metallic stopping, 26.

E.

Election of officers and Council, 54.

Elephant tusks, the secondary dentine of, 76.

Ether, new apparatus for administration of, 8.

Expansion of the dental arch *vice* extraction, 109.

Exposed pulp, treatment of, 101.

Extraction, symmetrical, 33; for the correction of irregularities, Dr. Field on, 119; Mr. Canton on, 121; can the absence of teeth be transmitted hereditarily? 124.

Extraction *vice* expansion of the dental arch, 109.

F.

Fairbank, Mr., appointed auditor of treasurer's accounts, 43.

Fergusson, the late Sir William, Mr. Cartwright on, 51.

Field, Dr., on replantation, 21; on the preservation of the deciduous teeth, ib.; on the use of artificial light, 86; on the aspect of a working-room, ib; on the application of carbolic acid to exposed pulp, 100; instruments for use in Rigg's disease, by, 105; new annealing-lamp by, 106; on the correction of irregularity, 119, 123; on the so-called Rigg's disease, 176.

Finances, statement of, 60.

Foran, Mr. J. C. (Eastbourne), nominated non-resident member, 127.

Forceps, new, for extraction of upper molar stumps, 29.

Foster, Mr. Wm., report on Slayton's amalgam by, 163.

Fox, Mr. Ch. J., on irregularities, 73; on the mouth of a native of Venezuela, 106; on a geminated molar and wisdom tooth, 107.

Fracture of an incisor, 73; treatment of, 74.

G.

Gaddes, Mr., on the "conjoint scheme," 57; on the new bye-law, 58; on the danger of semi-anæsthetization, 83; on the formation of dentine, 98; on mechanical expansion of the dental arch, 125; on the process of absorption, 154.

Garland, Mr. T. G. T. (Exeter), elected non-resident member, 159.

Garner, Mr. J. R., on a case of hysteria, 79.

Gas, new apparatus for administration of, 8.

Gibbings, Mr. Ashley, on the proposed new bye-law, 56.

Globular calcification, 92.

Gold, its use at the Dental Hospital, 68; probable substitution of other material, 69.

Gout, its effects upon the teeth, 163.

Gum-work, continuous, Mr. Crapper on, 2; origin of the system, ib.; its objections, ib.; objection to sharply defined edges of suction-plates, 3; necessity of patients taking care of teeth when not in mouth, ib.; a wooden bowl desir-

able for washing teeth in, ib.; necessity for making the plate a perfect fit, ib.; mode of constructing, ib.; the cheoplastic process, 4; described in Dr. Harris's work on the "Principles of Dentistry," 5.

H.

HARDING, Mr. Geo. Hilditch, on the process of absorption in bone and tooth-structure, 129, 156.

Harris, Dr., on the cheoplastic process, 5.

Henry, Mr., appointed scrutator of the ballot, 47.

Hepburn, Mr., specimen of bone-work with natural teeth, 102.

Hockley, Mr. Geo., nominated resident member, 127.

Honorary secretaries, election of,

Howarth, Mr., exhibits a new lathe head, 8.

Howe's scalers superseded by Rigg's instrument, 105.

Howship's lacunæ, 133.

Hunt, Mr., on symmetrical extraction, 41.

Hutchinson, Mr. S. J., on the radical cure of alveolar abscess, 9; reply to discussion on the radical cure of alveolar abscess, 22; on aromatic sulphuric acid, 23; on symmetrical extraction, 41; on Dr. Slayton's new amalgam, 76; on the use of artificial light, 85; on mechanical expansion of the dental arch, 124; on the merits of Kirby's pneumatic hammer, 128; on the process of absorption, 151, 153; appointed auditor of treasurer's accounts, 43.

Hysteria, case of, with unusual symptoms, 79.

I.

ILLUSTRATION of a saliva-pump, 6.

Illustrations: of a tooth composed of vaso-dentine, 89; section of vaso-dentine, ib.; section of an osteo-dentine tooth, 91; of a case of ossified roots, 106; Dr. Coffin's appliance for expansion of the dental arch, 112; of abnormal approximation of the bicuspids and molars, 113; of upper lateral incisors bitten over by the cuspidate of the lower jaw, 114; of the same after treatment of the irregularity, 115; of a case of dental irregularity, and the result of treatment, 117.

Irregularities, treatment of, remarks by Mr. Coleman, 70; paper by Mr. Coleman, 109; the maxillæ of diminished size in civilized generations, ib.; two systems dealt with, 110; making the jaws harmonize with the teeth, 111; making the teeth harmonize with the jaws, ib.; advantages of the former method, ib.; Dr. Coffin's appliance, ib.; illustration of, 112; improvement in, by Dr. Kingsley, ib.; adaptation of the teeth to the maxillæ, 113; comparative advantages of the two methods of treatment, 114; case illustrative of the preceding, 115; treatment of prominent front teeth, 116; advantages of dispensing with mechanical aids, 118; conclusion, ib.

K.

KEELING, Mr. E. R., Jun., admitted member, 2.

King, Mr. C. Norman (Exeter), nominated for non-resident membership, 25; elected, 63.

King, Mr. Henry Augustus (Exeter), nominated for non-resident membership, 25; elected, 63.

Kingsley, Dr., improvement on Dr. Coffin's appliance for correcting irregularity, 112.

Kirby's pneumatic hammer, modification of by Mr. Chas. Tomes, 128.

L.

Lamp for artificial light, new, by Mr. Rogers, 85.

Lathe head, new, exhibited by Mr. Howarth, 8.

Laws, Mr. John (Bolton), nominated for non-resident membership, 45; proposed for membership, 63; elected, 79; admitted, 159.

Laycock, Dr. (Edinburgh), on the teeth of gouty subjects, 164.

Levason, Mr. (Hereford), elected non-resident member, 1.

Librarian, vote of thanks to the, 53; election of, 54.

Library: Report of the Librarian (Mr. Thos. A. Rogers), 47; donations to: by Mr. Francis Mason, 2; by M. Magitot, ib.; by the American Medical Association, ib.

Licences in Dental Surgery, proposed in Parliament, 55.

Light, a southern aspect best, 86.

Longhurst, Mr. Bell, on a singular paper pad in a misfitting dentine, 46.

Lyons, Mr., appointed scrutator of the ballot, 47.

M.

Magitot, M.E. (Paris), donation to Library by, 2; nominated for corresponding membership, 1; elected, 45.

Mason, Mr. Francis, donation to Library by, 2.

Medical corporations and licences in dental surgery, 55.

Meetings of the Society, annual, 45; monthly general, 1, 25, 63, 79, 103, 127, 159.

Members, deaths of, 61; elected during the year, statement of, 61; new, nominated and elected, ib.

Merson, Mr., on mechanical correction of irregularity, 124; elected resident member, 159.

Moon, Mr., on Mr. Tomes's radicular odontome, 30; on prevention of overcrowding, 42; on a case of fracture, 76; on the expansion method of correcting irregularities, 122.

Moore, Mr., relation of a case illustrative of the pathology of dentigerous cysts, 7.

Moore, Mr. (of Plymouth), on exostoses in teeth subject to alveolar abscess, 22; his treatment of alveolar abscess, ib.

Morris, Mr. (Chester), a lobulated fibroid tumour on a molar, sent for exhibition by, 127.

Mummery, Mr., on symmetrical extraction, 39; on premature extraction, ib.; on relief of overcrowding, 40; donation to Museum of skeleton of elephant's head, 25.

Murphy, Mr. Thos. (Bolton), nominated for non-resident membership, 25; elected, 63.

Museum, donations to: of the skeleton of an elephant's head, 25;

of ossified roots, 106; of an antique extracting instrument, 128; of a cast of the jaw of an aged negress, 160; of the head of a young alligator, 161.
Museum: report of the curator (Mr. Charles S. Tomes), 47.

N.

New members elected, statement of, 61.
New members, mode of election, conversation on, 160.
Nitric acid, application of to exposed pulps, 102.

O.

Odontome, radicular, case of, narrated by Mr. Moon, 30.
Odontomes, 92.
Officers and Council, election of, 54.
O'Meara, Mr. (Simla), donation to Museum by, 161; on the loss of teeth among native Indians, 178.
Osteo-dentine, development of, 90.
Overcrowding, Mr. Cartwright on measures to prevent, 39; Mr. Mummery, ib.; Mr. Coles on, 40; Mr. Hutchinson on, 41; Mr. Moon on, 42.
Ozokerine (Messrs. Field's), a new product of petroleum, 161.

P.

Pad of paper in a misfitting dentine, 46.
Palmer, Mr. (Cheltenham), new vulcanite flask by, 29.
Papers read: by Mr. S. J. Hutchinson, 9; by Mr. Ashley Barrett, 33; by Mr. C. S. Tomes, 87; by Mr. Coleman, 109; by Mr. G. H. Harding, 129; by Mr. Oakley Coles, 169.
Pasmore, Mr. George Frederick (Exeter), nominated for non-resident membership, 1; elected, 45.
Payne, Mr. E. T. (Southampton), proposed for non-resident membership, 79; elected, 103.
Pedley, Dr. Thos. F., nominated for resident membership, 25; elected, 63; admitted, 159.
Pedley, Mr., on a new apparatus by, for administration of gas and ether, 8; on a form of regulating plate, 161.
Periodontitis resulting from devitalization of the pulp by arsenic, 103.
Phillips, Mr., model by, of the mouth of a native of Venezuela, 106.
Plici-dentine, development of, 90.
Position of Odontological Society, 60.
Poundall, Dr. Wm. Lloyd (Brighton), nominated for non-resident membership, 25.
President, election of, 54.
President's address, 49.
President's opening address, 65.
Pulp, devitalizing by arsenic, 21.
Pump, saliva, exhibited by Mr. Claude Rogers, 6, 45.

R.

Ranger, Mr. W. G., on a lobulated fibroid tumour on a wisdom tooth, 128; specimen illustrating Howship's lacunæ, 143; on the process of absorption, 153; on the so-called Rigg's disease, 179.
Read, Mr., on a fracture of an incisor and its treatment, 73;

on specimens of twin teeth, 73; on Dr. Slayton's amalgam, 75.
Regulating plate, as used by Mr. Pedley, 161; new, contrived by Mr. J. S. Turner, 161.
Replantation in alveolar abscess, 21.
Resignations of members, 61.
Richardson, Mr., presentation of specimen of ossified roots by, 106.
Rigg's disease, so-called, its nature and treatment, 165; views of Mr. Charles Tomes, ib.; of Dr. Arkövy, 166; of Mr. Oakley Coles, 169; inconvenience of personal nomenclature, ib.; recession of the gum, 171; a condition to be classed with the "diseases of modern life," ib.; doubtless due to impaired local nutrition, 172; deposition of the tartar, 173; atrophy of the periosteum of the fang of the tooth, 175.
Rigg's disease, new instruments for, by Dr. Field, 105.
Robertson, Mr. Andrew (Hereford), nominated for non-resident membership, 1; elected, 45.
Rogers, Mr. Claude, saliva-pump by, 6; on a new saliva-pump, 45; on a tongue-shield, 46; new lamp by, 85; elected resident member, 1; admitted, 25.
Rogers, Mr. Thomas, on a case of fracture, 75; on the formation of dentine, 78; on the condition of the Society's Library, 47; on the proposed new bye-law, 57.
Rutterford, Mr., donation to Museum by, 160.

S.

Salicylic acid, its action on the teeth, 162.
Saliva-pump, exhibited by Mr. Claude Rogers, 6.
Scrutators of the ballot, appointment of, 47.
Secretaries, honorary, election of, 54.
Secretaries, vote of thanks to the, 53.
Sewill, Mr. Henry, on mechanical treatment of dental irregularities, 121; on the teeth in the diagnosis of gout, 163.
Shield for tongue, new, by Mr. Rogers, 46.
Simmonds, Mr. Jos. J., admitted member, 2.
Slayton's, Dr., new metallic stopping, 26; case treated with by Mr. Read, 74; analysis of, 163.
Smith, Mr. W. Taylor, admitted member, 2.
Special meeting of the Society, 54.
Stewart, Dr., on the teeth of gouty subjects, 164.
Stocken, Mr., on the constitution of the patient in alveolar abscess, 22; new amalgam-carrier and plugger, by, 46.
Stopping, Dr. Slayton's new metallic, 26; analysis of, 163.
Swallowing artificial teeth, case of, 28.
Symmetrical extraction of teeth, 33.

T.

Teeth: alveolar abscess, 9; its radical cure, ib.; the limits of useful preservation of the teeth, 11; classification of cases, ib.; aconite and chloroform as a dressing for, 13; necessity for thoroughness in cleaning out the fang, ib.; use of carbolic acid,

14; avoidance of water and glycerine, ib.; other preparations for filling, 15; conservative antiseptic dentistry, 16; authorities on the subject, ib.; conservation of the tooth by creosote and morphia, 17; arsenic as a permanent dressing, ib.; cases cited, 18; pure carbolic acid treatment best adapted for the purpose, 19; diagnosis of the seat of alveolar abscess, 20; Dr. Slayton's new metal for filling teeth, 26; a fatal case of teeth swallowing, 28; the symmetrical extraction of teeth, 33; case of fracture of the right upper central incisor treated in a novel manner, 72; specimens of turn teeth, 73; balls of secondary dentine from the tusk socket of an elephant, 77; dentine calcification, 87; how healthy dentine is built up, 88; development of typical vaso-dentine, ib.; plici-dentine, 90; osteo-dentine, ib.; globular masses of dentine, 91; odontomes, 92; normal odonto-blast calcification, 94; calcification of the dentinal fibrils, 96; periodontites resulting from dentalisation of the pulp by arsenic, 103; upper molar with roots coated with a thin layer of bone, 106; teeth of a native of Venezuela, ib.; dental irregularities, extraction *vice* expansion of the dental arch, 109; making the jaws harmonize with the teeth, 111; making the teeth harmonize with the jaws, ib.; Dr. Coffin's appliance, ib.; treatment of prominent front teeth, 116; advantages of dispensing with mechanical aids, 118; the process of absorption in bone and tooth structure, 129; definition, 130; changes in the dental alveoli, 131; Howship's lacunæ, 133; canaliculization, 134; pathological aspect of the subject, 136; shedding of temporary teeth, 141; absorption in the permanent set a morbid process, 144; effects of non-absorption of temporary teeth, 147; necrosed teeth and the causes of their absorption, 148; teeth of gouty patients, 163; the nature and treatment of Rigg's disease, so-called, 165, 169; one of the "diseases of modern life," 171; doubtless due to impaired local nutrition, 172; deposition of the tartar, 173; atrophy of the periosteum of the fang of the tooth, 175.

Tomes, Mr. Charles, on Rogers's saliva-pump, 6; on a lobulated calcified tumour attached to a lower molar, 7; on an elephant's tusk, 7; on the treatment of alveolar abscess, 22; on inflammation of the soft parts, ib.; on a vulcanite flask by Mr. Palmer, 29; on forceps for the extraction of upper molar stumps, ib.; on an improved tongue-holder invented by himself, 29; on the proposed new bye-law, 56; on the secondary dentine of an elephant, 76; on some forms of dentine calcification, 87; on calcification of the pulp, 102; on the pathology of Rigg's disease, 105; on a specimen of ossified roots, 106; on correction of dental irregularity, 122; ex-

hibition by, of misplaced or supernumerary canine, 127; of a lobulated fibroid tumour on a molar, ib.; of an antique extracting instrument, 127; modification of Kirby's pneumatic hammer, 128; on the process of absorption, 152, 153; on the nature and treatment of Rigg's disease, so-called, 165; elected a fellow of the Royal Society, 127.

Tongue-holder, new, invented by Mr. Tomes, 29.

Treasurer's financial statement, 60

Treasurer, vote of thanks to the, 53

Treatment of dental irregularity, 109.

Trill's flask, a modification of by Mr. Palmer, of Cheltenham, 29.

Turner, Mr. J. S., on the proposed new bye-law, 58; new regulating-plate by, 161.

Twin teeth, specimen of, 73.

U.

Underwood, Mr., on the president, 53; on qualification for the membership of the Society, 55; on the mode of balloting for members, 159.

V.

Vanderpant, Mr., on arsenic in the treatment of alveolar abscess, 20; on pain caused by clasps, 46; on an irregularity, 73; on hysterical mania supervening after the administration of gas, 86; on the correction of dental irregularities, 122.

Vasey, Mr. Charles, on qualification for membership of the Society, 55; on the proposed dental licences, 58.

Vaso-dentine, development of 88.

Venezuela native, mouth of a, 106.

Vice-presidents, election of, 54.

Vote of thanks to the retiring President, 53.

W.

Weiss, Mr., on a case of artificial teeth swallowing, 28.

West, Mr. E. B., presentation to Museum of antique extracting instrument, 128.

West, Mr. Wm., nominated resident member, 127.

White, Mr., on calcification of the pulp a cause of pain, 99; carbolic acid on the odontoblasts, 99.

Woodburn, Dr. J. Cowan (Glasgow), nominated for non-resident membership, 25; elected, 63.

Woodhouse, Mr. Alfred, on continuous gum-work, 5; on the radical cure of alveolar abscess, 20; on the regulating plate, 161; on the teeth of gouty patients, 164.

Woods, Mr. W. T. (Calcutta), proposed for non-resident membership, 159.

Worster, Mr. Josiah W., nominated resident member, 127.

# INDEX TO PLATES.

PLATE I. Process of absorption in bone and tooth-structure.

Fig. 1. Longitudinal section of a human molar tooth, showing the granular layer of Tomes, broken by the action of absorption.

Fig. 2. Transverse section of the fang of the molar tooth of a rhinoceros, showing the interruption of Tomes's granular layer.

PLATE II. Fig. 3. Transverse section of a horse's tooth, showing excavations, the circular bays being occupied by bone lacunæ.

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